PIPELLE ENDOMETRIAL CURETTAGE WITH DILATATION AND CURETTAGE IN AUB - COMPARATIVE STUDY

A dissertation Submitted to the

THE TAMILNADU DR.M.G.R MEDICAL UNIVERSITY

in partial fulfillment of the registration

for the award of the degree of

M.D (BRANCH-II)

OBSTETRICS AND GYNAECOLOGY

COIMBATORE MEDICAL COLLEGE

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APRIL- 2013

CERTIFICATE

This is to certify that this dissertation in"**PIPELLE ENDOMETRIAL CURETTAGE WITH DILATATION AND CURETTAGE IN AUB - COMPARATIVE STUDY IN COIMBATORE**" was a work done by **DR.C.RUBASOWNDARY,** under my guidance during the academic year 2010-2013.

This has been submitted in partial fulfillment of the award of M.D.Degree in Obstetrics & Gynaecology (Branch II) by The Tamilnadu Dr.M.G.R,Medical University,Chennai-600 032.

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DECLARATION

I Solemnly declare that this dissertation entitled **"PIPELLE ENDOMETRIAL CURETTAGE WITH DILATATION AND CURETTAGE IN AUB - COMPARATIVE STUDY IN COIMBATORE"** was done by me at Coimbatore Medical College Hospital during the academic year 2010-2013 under the guidance and Supervision of **Prof.Dr.Suthandradevi,M.D.,DGO.**

This Dissertion is submitted to the Tamil Nadu Dr.M.G.R.Medical University,towards the partial fulfillment for the award of M.D.Degree in Obstetrics & Gynaecology (Branch II).

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I will be failing in my duty if I do not make a special mention about the tolerance and Co-operation, extended by my **Patients,** during the course of my study. I sincerely thank them, for, without them this study would not have been possible.

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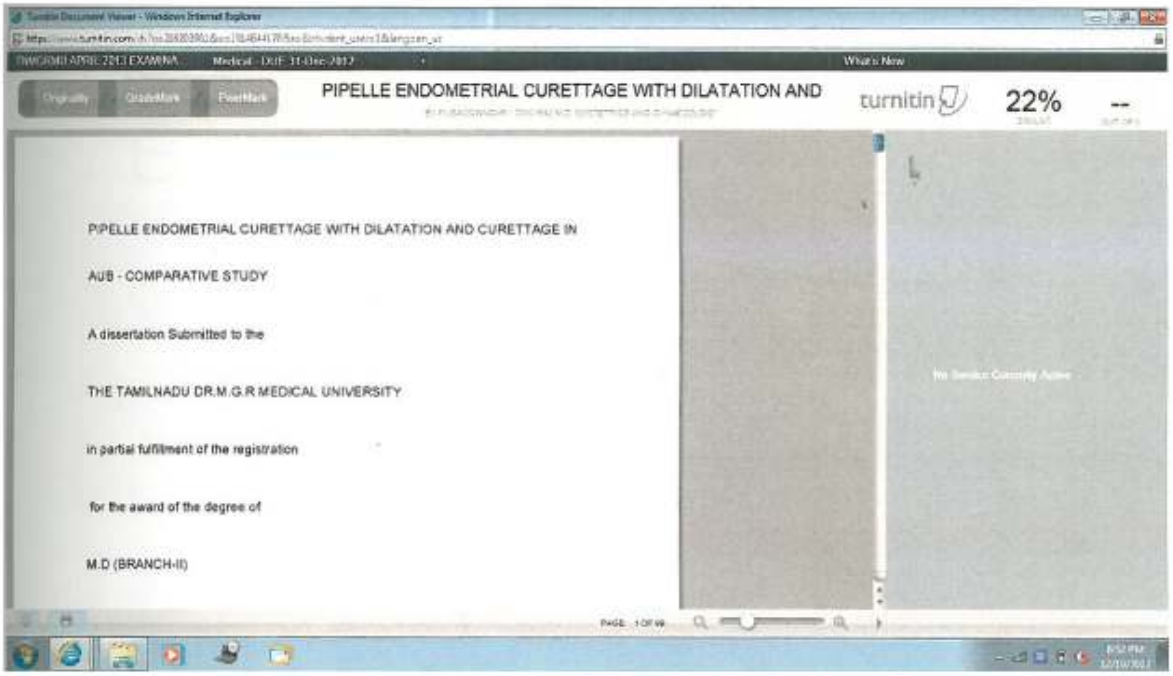
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CONTENTS

PIPELLE ENDOMETRIAL CURETTAGE WITH DILATATION AND CURETTAGE IN AUB - COMPARATIVE STUDY

ABSTRACT

Any type of bleeding with an increase in duration, frequency or amount is defined as abnormal uterine bleeding (AUB). AUB affect 10-30 % of reproductive age women and upto 50% of perimenopausal women. Age and reproductive status affect the incidence. Main reason for endometrial sampling is to confirm the benign nature of the problem by ruling out endometrial carcinoma so that medical and conservative surgery can be offered.

OBJECTIVE

To compare the results of histopathological diagnosis of Pipelle sampling with D&C and adequacy of tissue for histopathological diagnosis of Pipelle sampling with D&C. To assess the feasibility of Pipelle type of endometrial sampling as an outpatient procedure in AUB.

METHODOLOGY

This is a prospective study comparing D&C and Pipelle type of endometrial sampling in patients with abnormal uterine bleeding. 100 cases of AUB attending the outpatient clinic in the department of

Obstetrics and Gynaecology, Coimbatore medical college, in the period of July 2011- July 2012 were enrolled in this study.

RESULTS

All patient underwent both Pipelle sampling and D&C. D&C was considered as the definitive procedure for diagnosis. Premenopausal patient had menorrhagia as their main complaint. Most of the Post menopausal patients had post Menopausal bleeding as their complaint. Sufficient sample was obtained in 72 patients and 28 patients had insufficient sample in Pipelle. With D&C, sufficient sample was obtained in all patients. HPE Report obtained in Pipelle was only 88 %, whereas in D&C it was 100%.

The most important factor associated with scanty tissue at Pipelle sampling was found to be endometrial polyp. There was 100 % sensitivity and specificity of Pipelle for diagnosing endometrial carcinoma and endometrial hyperplasia.

In nulliparous women 40% had tough procedure. Elderly patients (≥50 years) had more inadequate sample rate 53.3%. In premenopausal patients HPR was available in 64 patients (91.4%).

In postmenopausal patients, report was available only in 24 (80%). ROC curve gave the cut –off value for endometrial thickness of 9mm for

successful histopathology reporting. No major adverse events were associated with the procedure. All patients tolerated the procedure well.

CONCLUSION

Endometrial sampling using Pipelle device is an easy and convenient method of getting tissue diagnosis. The sensitivity and specificity of this procedure in detecting endometrial hyperplasia and carcinoma were comparable with those of the standard procedure-D&C. Pipelle's sampling failed to detect endometrial polyp. Considering all factors together, though Pipelle sampling failed to get sufficient sample in 12% of cases, comparing the high specificity in detecting endometrial hyperplasia and carcinoma, the cost effectiveness and anesthetic morbidity, intra and postoperative complications, Pipelle sampling can be used as an effective screening procedure in the outpatient department.

KEYWORDS

Abnormal Uterine Bleeding (AUB), Menopause, Histopathology, Pipelle, Dilatation and Curettage.

INTRODUCTION

Any type of bleeding with an increase in duration, frequency or amount is defined as abnormal uterine bleeding (AUB). AUB affect 10-30 % of reproductive age women and upto 50% of perimenopausal women[1].Age and reproductive status affect the incidence. Main reason for endometrial sampling is to confirm the benign nature of the problem by ruling out endometrial carcinoma so that medical and conservative surgery can be offered.

A detailed history and physical examination are fundamental for workup of AUB[2,3]. Women presenting with perimenopausal abnormal uterine bleeding, postmenopausal bleeding or history of chronic anovulation are at high risk of developing endometrial pathology. Hence in these patients endometrial sampling for histopathological evaluation becomes mandatory. Various methods of endometrial sampling are used in practice. Dilatation and curettage (D&C) still remains the most common endometrial sampling method in India. It is the commonest invasive method. But there are short term and long term complications associated with the procedure. An alternative for D&C is office endometrial biopsy, which does not require cervical dilatation and hence can be done as an outpatient procedure without anesthesia.

By using outpatient procedure of endometrial sampling we can reduce the cost and complications associated with conventional D&C. Of the several endometrial sampling methods, Pipelle device has been found to be very comfortable and gave comparable histological findings from tissue obtained by D&C or hysterectomy. Since 1980 the most popular device is disposable Pipelle that was first introduced in France. It is semi rigid plastic tube with single side opening having a diameter of 3.1mm. It can be inserted without cervical dilatation. So it is an ideal device for outpatient setting. It causes less pain than other devices. The safety and acceptability of the device has been reported in various studies.

10% failure rate of outpatient endometrial sampling has been attributed to procedure as well as tissue failure. It is expected to obtain insufficient sample in women with atrophic endometrium. On the other hand in the presence of carcinoma, outpatient endometrial sampling is unlikely to fail in obtaining an adequate sample[4].Though many studies have been reported from outside India about the usefulness of Pipelle type device in outpatient endometrial sampling, very few studies are available in India. This study was conducted to establish the effectiveness of Pipelle type of device as an outpatient procedure, so that number of traditional D&Cs under anesthesia can be reduced.

AIM OF THE STUDY

1. Comparing the results of histopathological diagnosis of Pipelle sampling with D&C.
2. Comparing the adequacy of tissue for histopathological diagnosis of Pipelle sampling with D&C.
3. To assess the feasibility of Pipelle type of endometrial sampling as an outpatient procedure in AUB.

MATERIALS AND METHODS

This is a prospective study comparing D&C and Pipelle type of endometrial sampling in patients with abnormal uterine bleeding.100 cases of AUB attending the outpatient clinic in the department of Obstetrics and Gynaecology, Coimbatore medical college, in the period of July 2011- July 2012 were enrolled in this study.

INCLUSION CRITERIA

1. Age 30 years and above.

2. Patients with AUB.

3. Associated medical complication like HT and DM.

4. Any endometrial thickness in premenopausal women and more than 4mm thickness in postmenopausal women.

EXCLUSION CRITERIA

1. Cervical stenosis.

2. Lower genital tract infection.

3. Extra uterine causes of AUB.

4. Cervical causes of AUB.

5. Endometrial thickness of ≤ 4mm in postmenopausal women.

A detailed history was taken and the patients were examined thoroughly and the findings were documented.

The following preoperative investigations were done

- Hemoglobin
- Urine analysis
- Blood sugar and urea
- VDRL and HIV
- USG
- ECG,X-ray chest
- Anesthetic assessment

Injection Tetanus Toxoid 0.5ml was given

After getting the informed consent and proper selection of patient's with AUB, endometrial sampling with Pipelle was done and then followed by formal D&C under anesthesia in theatre to the same patient the next day. Both specimens were sent to histopathology department and the results were compared.

The patient's bladder was emptied before the procedure. A speculum examination was done followed by bimanual pelvic examination. Pipelle endometrial device was introduced under aseptic precautions and without cervical dilatation . After creating negative pressure and with a rotatory movement it was withdrawn. The tip of the Pipelle device was cut. The piston was advanced and the sample was collected.

Under anesthesia conventional dilatation and curettage was then done the next day. After bimanual pelvic examination uterine length was measured with uterine sound. After adequate cervical dilatation, endometrial curettage was done. The curettings were collected.

The specimens obtained from the Pipelle sampling and D&C, were sent for histopathological reporting.

REVIEW OF LITERATURE

Abnormal uterine bleeding (AUB) can arise from varying number of sources. AUB can affect 10-30 % of reproductive age women and upto 50% of perimenopausal women[1].Dysfuntional uterine bleeding is a diagnosis of exclusion after eliminating the causes of AUB[5] . Goal of the clinical evaluation of AUB is to establish a diagnosis in the most efficient and least invasive manner possible.

Abnormal Uterine Bleeding can arise from one of the three broad etiologic categories.

- First is due to organic lesions.
- Second is dysfunctional uterine bleeding.
- Finally systemic abnormalities.

ORGANIC LESIONS OF AUB

It includes pregnancy associated causes and structural causes. Structural causes are grouped as either focal (fibroids, polyps, adenomyosis) or diffuse (endometrial atrophy, hyperplasia or cancer and diffuse adenomyosis) lesions. 20%-40% of women have fibriods[6].

Table.1 Structural Causes

Uterine polyp,leiomyoma ,adonomyosis
Endometrial hyperplasia or endometrial carcinoma
Mechanical cause-IUD
Infections : endometritis, PID, tuberculosis
Vascular (arteriovenous malformations)
Partial outflow obstruction-asherman syndrome

SYSTEMIC ABNORMALITIES OF AUB

It includes exogenous hormone adminstration (sex steroids,corticosteroids), coagulopathies, hepatic failure, chronic renal failure, endocrinopathies (hypothyroidism,hyperthyroidism,adrenal disorders,PCOS,obesity ,hypothalamo-pituitary disorders).

DYSFUNCTIONAL UTERINE BLEEDING

It can be anovulatory or ovulatory. Anovulatory bleeding most commonly ocuurs in the extremes of reproductive age group, the cause being immaturity of the hypo-thalamo pituitary ovarian axis in the adolescent age group and insensitve ovarian follicles in the perimenopausal age group.

Table 2. Causes of AUB in Reproductive age women[1]

Pregnancy complications
Anovulation associated
Coagulation abnormalities
Submucous, intramural fibroids
Endometrial polyps
Endometrial hyperplasia, carcinoma
Infection and Medication related
Intrauterine device complications

The probability of encountering some of the pathogenic causes of AUB changes across adolescence, through reproductive period, to perimenopausal and menopausal period. The incidence of most structural lesions causing AUB, such as leiomyoma, polyps, endometrial carcinoma and adenomyosis rise with increasing age. Conversely, pregnancy complications as a source of AUB, become less frequent, as the incidence of pregnancy decreases across the reproductive age. Other conditions like infections, drug induced AUB and anovulation is encountered throughout life. Anovulatory bleeding and hormonal drug induced bleeding remains the most common source of non cyclical uterine bleeding.

PERIMENOPAUSE

The older terms Perimenopause or climacteric refers to the time period in the late reproductive years. It is usually in the late 40s and early 50s. The recently preferred terminology is menopausal transition (MT).It is defined by the World Health Organization as the period beginning 2 to 8 years prior to the final menstrual period (FMP)[7]. Treolar et al collected data of 2700 American women for 29 years with menstrual diaries. They assessed the changes which occurred with reproductive aging.

They concluded that, women in the age group of 20-40 years were characterized by regular cycles with a gradual fall in total cycle length of 2 to 3 days. Cycles showed a tendency to become irregular after the age of 40 years, primarily occurring approximately 7 years before reaching menopause[8].

Bleeding pattern in perimenopausal women

The most common clinical problem in peri and post menopausal women is AUB. It constitutes 70% of the hospital visits in this age group. There is no consistent normal uterine bleeding pattern during perimenopause. As like perimenarchial girls, dysfunction of the hypothalamo- pituitary- ovarian axis, resulting in anovulatory cycles becomes a more common finding in this group. The incidence of bleeding

related to pregnancy and sexually transmitted diseases decreases with age. The risk of benign and malignant neoplastic growth increases with age.

For example, setxler and colleagues[9] (1990) analysed the charts of 500 perimenopausal women and studied the alterations in their menstrual flow. They concluded that 18 percent had menorrhagia or metrorrhagia.One fifth of these 18% were due to premalignant or malignant disease. About 70% of perimenopausal women exhibited reduced frequency and quantity of uterine bleeding. Only 12 % stopped bleeding abruptly.10% of women with AUB in this age group can have endometrial carcinoma as in postmenopausal bleeding[10].Hence investigation is mandatory in cases presenting with risk factors for endometrial hyperplasia and carcinoma. All women who present with irrugular bleeding in this age group should undergo further evaluation as per the guideline[6,11]

Theories

One of the many theories put forth to explain the mechanisms of abnormal perimenopausal bleeding is ovulation with a longer follicular phase. Estrogen level increases slowly during this phase. The endometrium is exposed to the proliferative stimulus of estrogen for a longer period of time resulting in thicker endometrium. The bleeding following

progesterone withdrawal will be heavy and long[12]. This pattern is seen in some women early in perimenopause, even though there is an overall tendency for the follicular phase to shorten. The proliferation of endometrium continues until either the estrogen level declines resulting in bleeding, or the disorganized endometrium promotes unpredictable,

irregular bleeding[13]. Perimenopausal women have been found to develop a relatively hyperestrogenic state with inadequate progesterone support, as seen by diminished luteal phase pregnanediol excretion[14,15]

During perimenopausal transition ample estrogen levels and prolonged endometrial stimulation in longer, anovulatory cycles contribute to the rising incidence of endometrial hyperplasia, growing myomas, and dysfunctional uterine bleeding (DUB) [14,16,17,.] . In one of the studies serum estradiol level was higher in women above 40 years presenting with menometrorrhagia (0.55 nmol/l vs 0.24 nmol/l) as compared to control group. But there was no difference in the FSH level[18].

A physiologic change in the length of menstruation is known to occur during the perimenopausal transition. Hence, investigation of all complaints of irregularity may not be warranted. Prolonged bleeding (lasting for more than 10 days) or intermenstrual bleeding (noncyclical) deserve workup[19].

Table 3. Causes of AUB in perimenoausal women[1]

Anovulation associated
Focal uterine lesions (fibroids, polyps, adenomyosis)
Diffuse uterine lesions(endometrial hyperplasia and cancer, diffuse adenomyosis)

Although polyps and leiomyoma are the most common anatomic lesions, clinicians should keep in mind the possibility of endometrial cancer in the aging women. Approximately 170,000 new cases of endometrial cancer occurred in 1997[20] .The incidence of endometrial carcinoma increases with age. Between 30 to 39 years the incidence was 2.3 per 100000.In the perimenopausal age group (40-49 years), it increased to 36.2 per 100000.[21]

POSTMENOPAUSAL BLEEDING

The term menopause refers to a point of time that follows 1 year after the cessation of menstruation. Evaluation of any patient presenting with bleeding after this period is mandatory[22].The age of menopause is genetically determined, the average age being 51.5 years. Cause of postmenopausal bleeding may be uterine or extra uterine[23]. Clinical examination will reveal tumours of the cervix, vagina and vulva. Causes of uterine bleeding are listed below.

Table 4.Causes of postmenopausal Uterine Bleeding [24]

Causes	Percentage %
Endometrial atrophy	30
Exogenous estrogen	30
Endometrial cancer	15
Endometrial polyp	10
Endometrial hyperplasia	5

The most common endometrial finding in women with postmenopausal bleeding is endometrial atrophy, accounting for 60% to 80% of such bleeding. Endometrial polyps account for 2% to 12% of postmenopausal bleeding. Polyps are often difficult to identify with office endometrial biopsy or curettage. Hysteroscopy, transvaginal ultrasonography or both may be useful adjuncts in identifying endometrial polyps.

Estrogen therapy is an established risk factor for endometrial hyperplasia and cancer. The risk for endometrial cancer is 4 to 8 times greater in postmenopausal women receiving unopposed estrogen therapy, and the risk is proportional to the duration and the dose of estrogen. This risk can be decreased by the addition of a progestin to the estrogen, either

cyclically or continuously. Endometrial biopsy should be performed as indicated to assess unscheduled bleeding or annually in women not taking a progestin. Endometrial hyperplasia occurs in 5% to 10% of patients with postmenopausal uterine bleeding. Endometrial cancer occurs in 10% of patients.

Endometrial Cancer

Several risk factors for the development of endometrial cancer have been identified [25,26,27,28,29,.](Table 5). Most of these risk factors are related to prolonged, unopposed estrogen stimulation of the endometrium.

Table 5. Risk factors for Endomentrial cancer

Characteristic	Relative risk
Nulliparity	2-3
Late menopause	2-4
Obesity	13
Unopposed estrogen therapy	4-8
Tamoxifen therapy	2-3
Atypical endometrial hyperplasia	8-29
HNPCC syndrome	20

Endometrial carcinoma most often occurs in women in the sixth and seventh decades of life, at an average age of 60 years. 75% of cases occur in women older than 50 years of age. About 90% of women with endometrial carcinoma have vaginal bleeding or discharge as the only presenting symptom. Most women recognize the importance of this symptom and seek medical consultation within 3 months. Less than 5% of women diagnosed with endometrial cancer are asymptomatic.

Perimenopausal women with endometrial cancer invariably have abnormal uterine bleeding which is often characterized as menometrorrhagia or cyclical bleeding that continues past the usual age of menopause.The diagnosis of endometrial cancer must be considered in premenopausal women if abnormal bleeding is persistent or recurrent or if obesity or chronic anovulation is present.

Endometrial Hyperplasia

Endometrial hyperplasia represents a spectrum of morphologic and biologic alterations of the endometrial glands and stroma, ranging from an exaggerated physiologic state to carcinoma in situ. Estrogen producing ovarian tumours, hormonal therapy, and endometrial cancer may be associated with endometrial hyperplasia resulting in abnormal bleeding.

The risk of endometrial hyperplasia progressing to carcinoma is related to the presence and severity of cytological atypia. Kurman and colleagues retrospectively studied endometrial curettings from 170 patients with untreated endometrial hyperplasia. They found that 1% of patients with simple hyperplasia, 3% of patients with complex hyperplasia, 8% of patients with atypical simple hyperplasia and 29% of patients with atypical complex hyperplasia progressed to carcinoma. Most of the hyperplasia seemed to remain stable (18%) or regress (74%).

The premalignant potential of hyperplasia is influenced by age, underlying ovarian disease, endocrinopathy, obesity, and exogenous hormone exposure.[30,31]

Table 6.Classification of endometrial hyperplasia [32]

Type of Hyperplasia	Progression to cancer (%)
Simple (cystic without atypia)	1
Complex (adenomatous without atypia)	3
Simple(cystic with atypia)	8
Complex(adenomatous with atypia)	29

The diffuse lesion may be screened by endometrial imaging procedures, but final diagnosis relies on HPE of tissue. This can be accomplished by several sampling procedures. But the best method to establish and stage these diffuse lesions is complete histological evaluation of a hysterectomy specimen.

Uterine Polyps

By menopause, polyps are the most prevalent focal uterine lesions. Polyps also represent the most common cause of endometrial thickening, so they may present sonographically as either a focal or a diffuse lesion. This makes differentiation from hyperplasia and cancer of the endometrium problematic by TVUS alone.[33]Sonohysterography is a more reliable means of detecting polyps than TVUS.[34] Risk factors for polyps overlap those for endometrial hyperplasia. The incidence rises with increasing age.

Although not always consistent, polyps tend to demonstrate homogenous echogenicity with clear-cut borders and a narrow stalk that often exhibits a single vessel source by Doppler examination. The polyp usually crosses the midline and is contained within the endometrial strip when TVUS is used. Polyps are easily missed by endometrial biopsy and even TVUS. Sonohysterography and hysteroscopy promise the best

sensitivities in detecting uterine polyps. Adenocarcinoma can arise within a polyp or sometimes present directly as polyps. So polyps should be removed when found in postmenopausal women.

Atrophic Endometrium

Atrophic endometrium is the most common cause of postmenopausal AUB [35]. Women with atrophic endometrium have a history of irregular spotting. In such a case the endometrium is scanty at biopsy and the HPE shows a proliferative phase. In some circumstances, sonography may eliminate the need for endometrial biopsy to make the diagnosis of atrophic endometrium as the source of AUB. An endometrial thickness (ET) of <4 mm by TVUS suggests endometrial atrophy. However, if the ET exceeds 4 mm or if the texture is heterogenous, then TVUS is inadequate and biopsy is required for diagnosis.

THE DIAGNOSTIC PROCEDURES

Each of the commonly used diagnostic procedures for AUB is reviewed here regarding the data concerning their accuracy, as well as practical matters and their potential roles.

ENDOMETRIAL BIOPSY-D&C

When the source of the bleeding is the uterine cavity, sampling of the endometrium for histopathological examination is mandatory. Although D&C continues to be a commonly performed procedure for both its diagnostic and therapeutic benefits, office endometrial biopsy can often expedite appropriate evaluation and therapy. Almost 40% of the endometrial cavity is not being curetted in a D&C, and therefore a possibility of missing the diagnoses is always there. In particular, most focal lesions (polyps and fibroids) are missed by D&C in postmenopausal women with AUB [36].

The technique of dilatation

The patient was placed in the lithotomy position. A tenaculum was used to hold the cervix and the uterine cavity was sounded. This provides confirmatory information about the position of the uterus and length of the uterine cavity. It also tells the angulation between the cervix and body of uterus.By this the complication of perforation can be avoided.

3 or 4 mm Mathew Duncan dilator was first passed, then successively larger once were used. For ordinary curettage, dilatation to 8 or 9 mm is enough.

The technique of curettage of the uterus

After anesthesia patient is placed in lithotomy position. The bladder is emptied with a catheter. The pelvic organs are examined thoroughly before the patient is draped. The procedure includes a bimanual examination. The anatomical details of the reproductive tract can be best appreciated under anesthesia. The vagina and perineum are cleaned in the usual way. Endocervical curettage is done before dilatation of cervical canal. The uterine cavity is then sounded to determine the length and the position. The cervical canal is dilated. Dilatation upto 8 or 9 mm is sufficient. A small or medium sized, bluntly serrated curettw is then introduced into the uterus, and the entire uterine cavity is systematically curetted. A firm and gentle scraping of anterior, lateral and posterior walls was done. Finally the top of the cavity is scraped with a side- to-side movement.

The handle of the curette should never be held against the palm of the hands. It should be held like a pencil. The instrument should be held loosely while inserting into the uterine cavity until the fundus is reached.

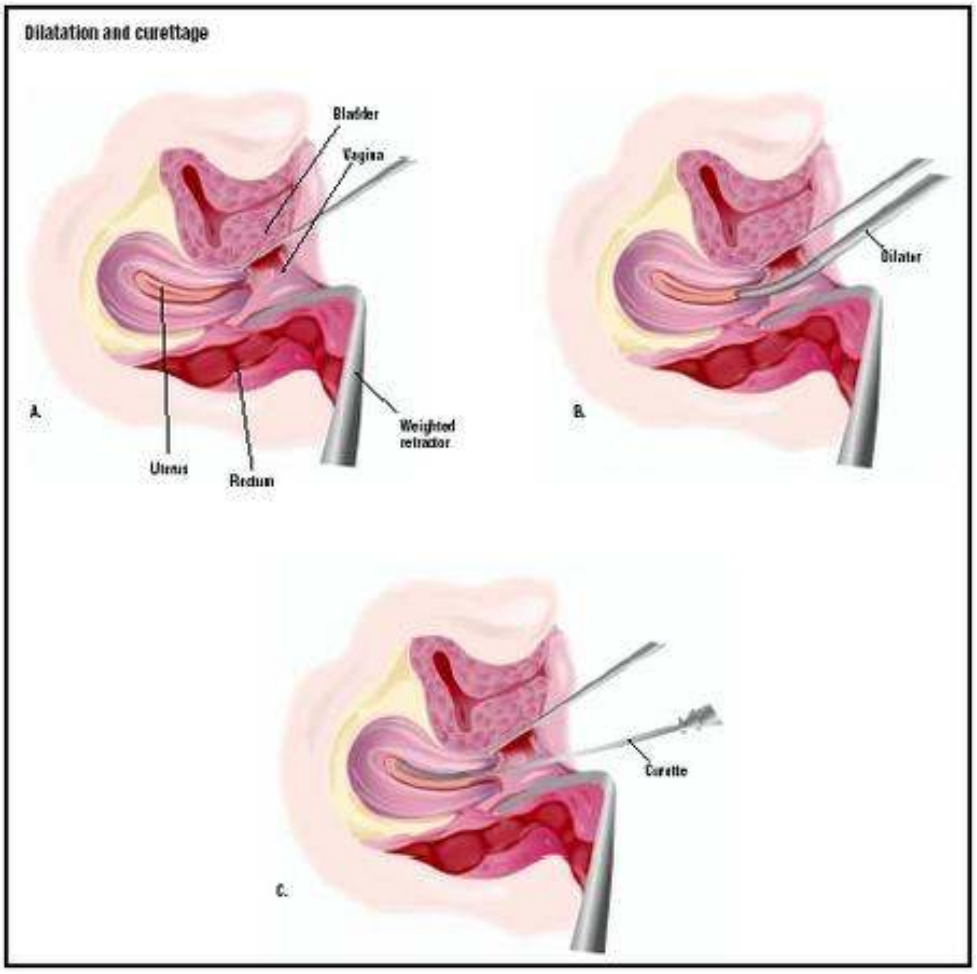
While withdrawing the curette, pressure is exerted against the uterine wall. It is drawn in an outward direction. After adequate curettage uterine vibration will be felt in the hand holding the curet. This is taken as a sign of adequate curetting. The curetting is collected in the gauze sponge.It should never be mashed. It should be picked with a smooth –tipped forceps and placed immediately in the fixative.

Complications of Dilatation and Curettage

Careful bimanual pelvic examination under anesthesia to assess the position and consistency of the uterus help in avoiding perforation. Care should be taken when the uterus is acutely anteflexed or retroflexed. Slight force is sufficient to cause perforation in post menopausal atrophic uterus. The resistance offered by the wall of the uterus will not be appreciated if perforation has occurred. Uterine sound or dilator as a cause of perforation is less dangerous than sharp curette. Perforation may leed to bleeding or trauma to abdominal viscera. When perforation is detected, curettage should be discontinued. We have to watch carefully for signs of hemorrhage or infection.

MacKenzia and Bibby reported, complications in 1.7% of cases of D&C. According to McElin and colleagues, 0.5% of cases had postoperative febrile morbidity after the D&C procedure. Perforation occurred in 0.63% of cases. Other complications were infection and anesthesia related complications. If local pathology is detected while examination that should be treated before doing the procedure.

Figure .1 Dilatation and Curettage



ENDOMETRIAL SAMPLING –OUTPATIENT BIOPSY

Outpatient endometrial biopsy has proven to be similar to the more invasive and costly D&C. Many instruments have been devised for the sampling of endometrial tissue and evaluation of the endometrial cavity. In 1882, Moriche obtained the first endometrial sample using a catheter and endometrial biopsy has been performed in an outpatient setting since 1935. The 1970's saw the introduction of Vabra curette followed by the Pipelle sampler in the 1980's.

Novak's Curette

Although this curette was initially devised to obtain a sample of the endometrium by suction and aspiration, it is most commonly used as a miniature curette that contained a serrated edge surrounding its biopsy aperture. The curette is about 5 mm in diameter and can usually be passed without dilatation through a small cervical canal, even in nulliparous women. Occasionally, the postmenopausal cervical canal is stenotic and difficult to penetrate.

In a study conducted by Hofmeister[37], office biopsy of endometrium was done for 23,202 patient belonging to all age groups . 273 cases of endometrial carcinoma was detected (1.76%) ,32(14.28%) of whom were asymptomatic. Hofmeister's routine office endometrial biopsies using a modification of the Novak and Randall curette provide

one of the largest clinical experience of this instrument to date. Unfortunately, only patients who had continued uterine bleeding or who demonstrated an atypical pattern in the office biopsy were subjected to a complete curettage.

Therefore, the true negative and false negative rate for the Novak type of curette in the detection of endometrial cancer has not been determined accurately.The main disadvantages with metal curettes were patient discomfort, cost and procedural complications such as uterine perforation and infection.

Silastic curette

Because of the discomfort associated with passage of the Novak curette, newer silastic curettes have been developed. These have a smaller diameter (3 mm), are flexible and are often better tolerated by patients. They can be difficult to pass through a truly stenotic cervix because of their pliability. Often there is an accompanying syringe attached which develops effective vacuum pressure to improve the size of the sample.

Vabra aspirator

The Vabra aspirator has been used extensively over the past 20 years. It is a disposable device and requires an external vacuum source,

usually an electric pump. The cannula is commonly plastic, with a 4-mm diameter, although 2- and 3-mm stainless steel curettes are also available.

A circumferential in- and - out motion is used to obtain a sample. Intravenous analgesia may be required to avoid discomfort during the procedure. Moreover, if the cervix is stenotic, larger cannulas may be difficult to introduce and cervical dilation may be necessary before sampling can be done. Vabra aspiration yields a sample comparable to that obtained with dilatation and curettage[38,39]

Karman cannula and syringe

The Karman cannula and syringe, unlike the Vabra aspirator, does not require an external vacuum source[40]. The cannula is usually 4 to 6 mm in diameter and is made of flexible plastic; it has two ports at the distal end. The cannula is used once and discardered, while the syringe, which produces the vacuum, may be reused. To obtain an adequate specimen, circumferential in - and - out motion is required. Intravenous analgesia may be necessary. In one small series[41], this technique was compared with dilation and curettage and was found to have similar diagnostic accuracy.

Figure 2a.Novak's Curette

Figure 2b. Vabra Aspirator

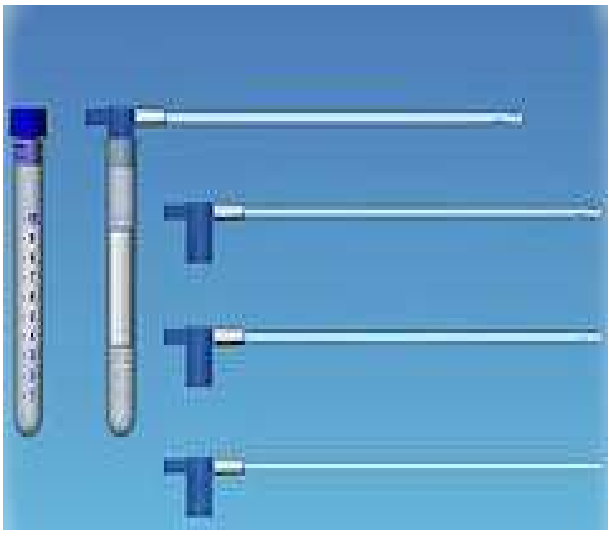
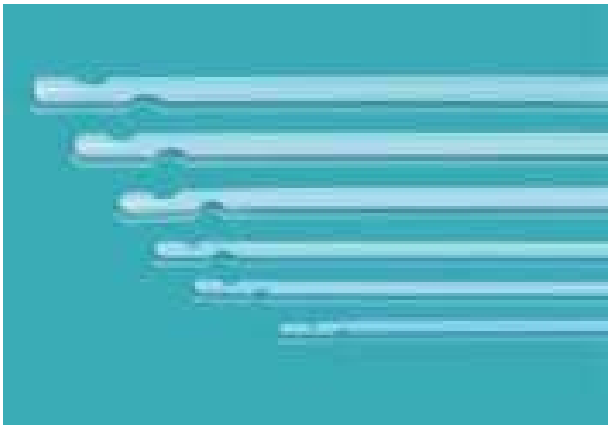


Figure 2c.Karman Cannula



PIPELLE

Pipelle's endometrial suction cannula does not require a syringe to develop negative pressure. It is a disposable plastic tube with a 3.1-mm outer diameter, an aspiration port at its tip and solid plastic obturator. The obturator fits so closely within the outer sleeve, that its slow withdrawal from the outer sleeve while withdrawing from the uterine cavity, causes sufficient suction to obtain an adequate endometrial specimen.

The Pipelle curette is introduced through the cervix to the uterine fundus. Vacuum is created by pulling the obturator completely back to a self-retaining stop at the proximal end of the tube. The tube is then rotated continuously between the thumb and first finger as it is moved from the fundus to the internal os and then back to the fundus. The endometrial tissue adjacent to the side port is steadily drawn in by the negative pressure. The specimen is readily visible as it accumulates in the lumen of the tube. When the desired amount of tissue is obtained, the instrument is withdrawn, the distal tip is cut off and the obturator is advanced to expell the specimen directly into fixative transport medium.

The Pipelle curette offers two advantages: it can traverse most cervical canals without prior dilation and it is generally well tolerated without analgesia.

FIGURE 3. PIPELLE CURETTE AND ITS SAMPLING PROCEDURE

Figure 3 a.

Figure3 b.

Figure 3 c.

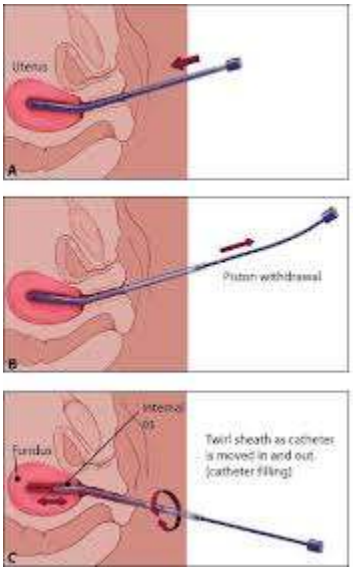
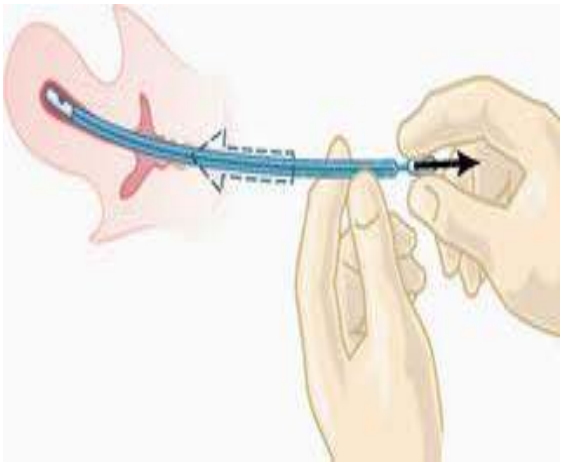


Figure 3 d.



PIPELLE ENDOMETRIAL SAMPLING –

WHAT DOES STUDIES SAY

Accuracy

A review of the studies containing information regarding the accuracy of endometrial sampling using 18 different devices from 1966 to 1999 , was done by Dijkhuizen et al. He identified 39 informative studies involving 7914 women[42].The studies included combinations of menopausal and/or perimenopausal women. Either subsequent formal D&C or hysterectomy was used as a reference compared with office endometrial biopsy. Diagnostic accuracy was better in menopausal women. Yet overall accuracy was good in all women, especially with the use of the Pipelle brand of curette, where sensitivity for endometrial carcinoma was 99.6% and specifically was 91%. Sensitivity for atypical hyperplasia was 81% with a specificity exceeding 98%

A similar systematic review study by Clark et al, involving 1013 patients from 11 primary studies, using 6 different commercial clinic biopsy instruments, identified good accuracy for a biopsy to pickup endometrial cancer, if the specimen was adequate for histopathological evaluation[43]. Failure rate put together for obtaining an adequate specimen was 7% and biopsy failure was more common in menopausal women.

Endometrial biopsy results were also compared with D&C or hysterectomy taken as a standard reference. When a biopsy was positive for cancer, the post biopsy probability of endometrial cancer was 81.7 % (95% CI; 59.7-92.9) the pooled probability that a negative biopsy missed an endometrial cancer was 0.95(95%CI, 0.4-2.4).

If pathology is local, endometrial sampling is associated with a greater percentage of false –negative results, such as endometrial polyps. Guido and associates (1995) reported false negative results in 11 of 65 patients (17%) undergoing Pipelle endometrial sampling for abnormal bleeding [44]. Five of 11 patients had malignant tissue present only in endometrial polyps, and another 3 patients had disease localized to less than 5% of the endometrial surface. Overall, a positive result was accurate in the diagnosis of endometrial cancer whereas a negative result was not. Therefore, if an endometrial biopsy is negative in a situation where AUB continues, or if a biopsy cannot be obtained, then further more aggressive diagnostic efforts are warranted.

Adequacy of sample

In the study by Ben- Baruch et al (1994) Pipelle endometrial sampling was attempted in 174 women[45]. One hundred and seventy (98.8%) of the Pipelle aspirations attempted were successfully completed.

Sufficient material for histological assessment was obtained in 154 (90.6%) women. In postmenopausal women, adequate specimens were obtained in 74 of 88 (84.1%) by Pipelle. In 45 cases the histological diagnosis of the endometrium obtained by Pipelle device was compared with sample obtained by D&C or hysterectomy done shortly thereafter. Histopathological finding were identical in 43out of 45 cases. Endometrial sampling with the Pipelle was well tolerated, occasionally causing slight discomfort. Shazia Fakhar et al [46] reported an adequate sample in 98% cases (total cases-100). Ajit Kuruvilla et al reported histological diagnosis were obtained in 68.6% of patients, in a sample size of 102 cases.Insufficient sample was obtained in 32 patients and 22 of them had endometrial polyp and one had endometrial hyperplasia[47].

Smith –Bindman [44], 1998 reported that, a tissue sample inadequate for histological evaluation was obtained in 28% of biopsy attempts.

Cost effectiveness

Feldman et al [49] concluded that office biopsy was most cost effective initial evaluation procedure for patients of all age group presenting with AUB. It also seems to be cost effective procedure of choice for those patients with risk for endometrial carcinoma and complex hyperplasia presenting with postmenopausal bleeding for the first time.

Pain related to the procedure

Silver et al[50] made a randomized study comparing Novak and Pipelle endometrial biopsy instruments with respect to quality of the biopsy obtained and pain related to the procedure. The instruments yielded biopsies of similar quality (p = 0.856). Pain scores were lower for the Pipelle (p= 0.001). The pathologist showed no preference when choosing Novak or Pipelle slides (x2=2.08.p=0.149).

TRANSVAGINAL ULTRASOUND

Screening for endometrial hyperplasia and carcinoma can be accompanied with transvaginal ultrasound as well. Sonographic picture and histopathology do not correlate, thereby making tissue diagnosis mandatory. In general, endometrial thickening, hyperechogenicity and heterogenous texture represent higher risk for cancer. Other features suggestive of cancer are an enlarged uterus, fluid within the cavity, increased blood flow and an irregular interface of the endometrium and myometrium.

As the volume of the mass rises the chances of malignancy also increases. Given the same endometrial thickness, another general rule is that, increasing age increases the risk of endometrial malignancy. Therefore, ET measurements predict the risk of endometrial cancer in postmenopausal women more accurately than in premenopausal woman. Indeed, TVUS has demonstrated good accuracy for detecting endometrial carcinoma in postmenopausal women.

A systematic analysis of 35 studies of TVUS among 5892 women with postmenopausal bleeding found prevalence rates of 13% for endometrial cancer and 40% for hyperplasia and / or polyps [48]. Pooled results focused only on ET and not other sonographic characteristics of the

endometrial lesions. Mean (±SD) ET measurements were 4 (±3) mm for polyps, 14 (±4) mm with hyperplasia, and 20 (±6) mm with carcinoma. The balance between sensitivity and specificity is dependent on the ET threshold used to define as abnormal. If 3 mm was used, sensitivity and specificity were 98% and 38% respectively; but if 5 mm was used, the test characteristics were 92 % an d 81% ; and if 10 mm was designated as abnormal,the test characterstics were 66% and 79%. The inference is that if the endometrial thickness exceeds 5mm, risk of cancer is 7.3% and it is <0.07% if the endometrial thickness is ≤ 5mm[51].

Measurements of ET have been shown to be highly reproducible to both intra and interobserver measurement[52]. Nevertheless, ET measurements are not useful in predicting the presence of endometrial hyperplasia or carcinoma in premenopausal women. Persistent noncyclical bleeding, along with finding of ET in excess of approximately 11mm, should trigger concern in premenopausal women, especially in those with risk factors for endometrial carcinoma[34]. Risk factors include extended duration of AUB, chronic anovulation, estrogen exposure, nulliparity, diabetes, obesity, hypertension and tamoxifen use. TVUS may not be that useful in defining diffuse endometrial lesions in premenopausal women with AUB, but they are useful in detecting focal anatomic lesions of the uterus.

SONOHYSTEROGRAPHY

It is more expensive and invasive than TVUS and transabdominal ultrasonography. Another disadvantage is that optimally it must be done only in the proliferative phase after the menses so that menstrual tissue does not give false positive results .Thick secretary endometrium is likely to conceal focal lesions. Performing and interpreting sonohysterography takes special training as outlined by the American college of Obstetrics and Gynaecology (ACOG)[53]

Reinhold and Khalili have suggested 3 circumstances where SHG is recommended, assuming indeterminate TVUS and endometrial biopsy have been performed already:

1. Thickened endometrium in the face of a non diagnostic biopsy.
2. Indeterminate TVUS.
3. Negative TVUS and biopsy findings but persistent bleeding.

HYSTEROSALPINGOGRAPHY

Hysterosalpingography (HSG) can reliably identify intracavitary masses. Occasionally subtle HSG findings can suggest a specific pathology. For example, when present, endometrial cancer tends to demonstrate irregular masses that are broad based. Another clue for

endometrial cancer is limited uterine distensibility by contrast fluid. Disadvantages of HSG include the inability to identify diffuse lesions, the sites of attachment of intracavitary masses, intramural or subserosal lesions and the relative invasiveness (pain and radiation exposure) of the procedure. In addition, there is a risk that intracavitary blood clots associated with AUB will yield false positive findings. Therefore the primary role of hysterosalpingography for AUB has not been promoted.

HYSTEROSCOPY

Decreasing the caliber of hysteroscopy equipment with its attendant patient tolerability and lower cost has provided new diagnostic and even therapeutic possibilities in an office setting. Hysteroscopy enables accurate visualization of intracavitary masses but the same may not be true with regard to diffuse lesions. Hysteroscopy is an invasive procedure requiring specialized equipment and training to perform and interpret the findings. Hence it is not suitable as a primary screening tool for evaluating AUB. When the less invasive measures such as blind biopsy, sonography, and SHG are inadequate, hysteroscopy is indicated.As experience grows, ambulatory hysteroscopy may one day change the currently popular 2 - stage approach that uses screening TVUS in conjunction with blind endometrial sampling.

DIAGNOSTIC STRATEGIES

Definitive diagnosis requires tissue confirmation; however routine endometrial sampling for all women with AUB is impractical. Instead skillful history, physical examination and directed laboratory work will be the most important initial diagnostic tools. The focus should be on determining those women with AUB who are at highest risk of endometrial cancer. During the reproductive time frame, these will typically be women with chronic anovulation.

The ACOG has suggested endometrial sampling in the following patient with anovulatory bleeding [53]. Even in adolescence, endometrial biopsy should be considered after 2 to 3 years of anovulatory bleeding, particularly in obese girls. Biopsy is indicated for all women suspected of anovulatory bleeding beyond 35 years of age,women who do not respond to medical therapy or who have risk factors for endometrial cancer . These ACOG recommendations do not incorporate criteria based upon any imaging studies. Endometrial sampling is also recommended in postmenopausal bleeding of any amount, regardless of a finding of atrophic vaginitis, polyp, or urethral caruncle. Prior to hystrectomy endometrial sampling is mandatory to exclude endocervical or endometrial carcinoma in postmenopausal women.

A panel of experts proposed elaborate diagnostic algorithms incorporating biopsy and imaging procedures for the evaluation of postmenopausal bleeding[54]. In postmenopausal women these experts recommended that a threshold endometrial thickness of ≤5mm does not require endometrial sampling. Similar safe endometrial thickness threshold has not been substantiated for premenopausal women. It is difficult to clearly demarcate between hyperplasia, cancer, and ovulatory endometrial thickness measurements in premenopausal women. In this age group USG measurement of endometrial thickness is less useful when compared with clinical suspicion and risk factors, based on which biopsy is planned.

In these women biopsy is based primarily on clinical suspicion and risk factors rather than on ultrasound measurements of endometrial thickness. A grossly increased endometrial thickness (greater than 12mm) increases the risk of disease and is an indication for sampling, even when clinical suspicion of pathology is otherwise low [55].

Moreover, there are substantial limitation to our knowledge about the accuracy, tolerability and cost efficiency of the available diagnostic tests for the evaluation of AUB in premenopausal women. Therefore, a universal linear evidenced-based algorithm incorporating imaging procedures for AUB cannot be assembled.

In case of AUB , when a structural lesion is suspected TVUS is the first line of investigation which will help to detect and segregate the same. Even if previous endometrial sampling was nondiagnostic, TVUS may identify diffuse disease, and it is superior to blind sampling to detect focal lesions.

Once anatomic lesions have been identified by examination or imaging, subsequent evaluation requires individualization. The prudent selection of appropriate tests depends upon their ability to characterize the anatomic lesions most highly suspected. Other variables that the clinician must balance include patient preference, available expertise, local cost and availability, risk and discomfort. Ultimately, test selection should be guided by the underlying principle that the results are capable of changing the clinical management of a patient in a meaningful way. Therefore, a clinician must be knowledgeable about the characteristics of each potential diagnostic test for each type of structural lesion.

HISTOPATHOLOGICAL DIAGNOSIS IN AUB

Benign and Physiologic Causes of Abnormal Bleeding

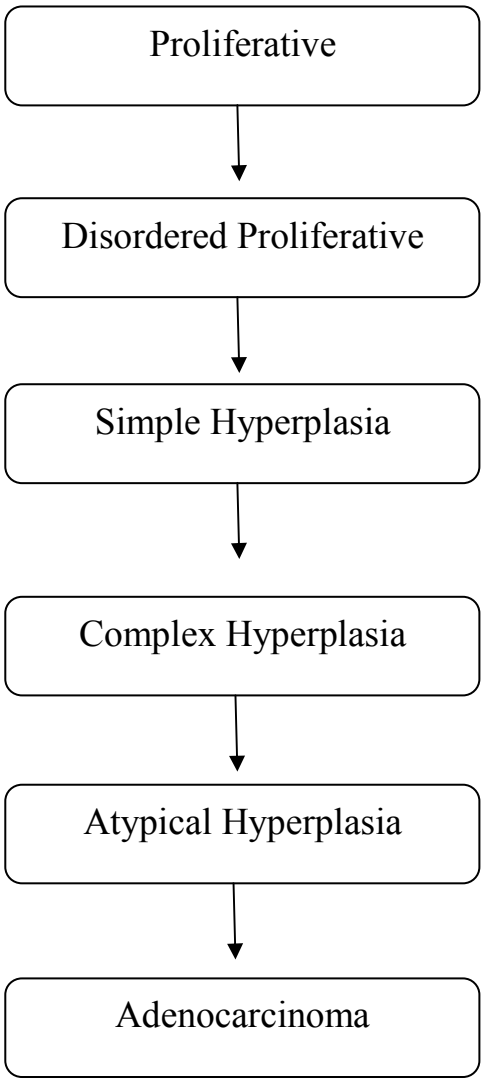
The underlying etiology for the abnormally bleeding patient is highly dependent upon age.[56] The most common diagnosis is often the simplest, usually seen as proliferative endometrium, particularly in perimenopausal patients[57](common in anovulation). **Proliferative endometrium** on histology shows tubular glands and the glandular lumens are round and regular. The endometrial stroma is compact and mitotic figures are common. In contrast, **secretory glands** show a simple epithelial lining. The glands are more undulant in their outline, secretions may be seen in the lumina, and the cells may contain subnuclear vacuoles. The stroma contains abundant, eosinophilic (pink) cytoplasm.

An **endometrial polyp** is more common than diagnosed. It is easier for the pathologist to diagnose this grossly in the intact uterine cavity after hystrectomy. During a curettage or biopsy, the polyp may be fragmented, and this destroys the architecture of the polyp. Important clues denoting a polyp are that of the polypoidal appearance seen histologically as three sided epithelium,dilated glands, fibrotic stroma and thick walled vessels.

Pathological Causes of Abnormal Bleeding

The strict definition of endometrial hyperplasia is an increase in glandular material per unit of stroma. Currently, most pathologist separate endometrial hyperplasia into simple, complex and atypical hyperplasia. Disordered proliferative endometrium is an intermediate diagnosis between proliferative type of endometrium and hyperplasia.

The sequelae of changes seen in the endometrium due to unopposed oestrogen are as follows. There is considerable overlap between these entities.



Disordered proliferative endometrium shows some glandular crowding and irregular glands with budding and branching. The glands affected by this are only focal and scattered throughout otherwise "normal" proliferative endometrium. It indicates unopposed estrogen stimulation to the endometrial lining.

Simple hyperplasia indicates many crowded and often cystically dilated glands with some out pouching and budding, lined by pseudo stratified nuclei that show minimal atypia.

Complex hyperplasia ("adenomatous hyperplasia") involves more definitive architectural atypia. Endometrial gland gives an irregular definition and increasing architectural complexity at low power. Due to these features, the endometrium appears more crowded.

Atypical hyperplasia ("complex atypical hyperplasia", "atypical adenomatous hyperplasia") is the most worrisome of these entities and the least likely to be reversible .The diagnosis of atypical hyperplasia is based upon nuclear atypia. This includes nuclear enlargement and nuclear irregularity, a vesicular chromatin pattern with nucleoli, loss of nuclear polarity and frequent mitotic figures.

Endometrial carcinoma in-situ is an older term implying a histological picture of well differtiated adenocarcinoma, which has not yet invaded the stroma. Because the degree and depth of invasion is almost impossible to accurately tell on a limited and fragmented biopsy, most pathologists prefer to diagnose carcinoma with FIGO grade. Because the depth of invasion is best assessed on gross hysterectomy specimen, a diagnosis of "carcinoma in situ" on an endometrial biopsy or curettage does not guarantee the absence of invasion in the uterus.

Figure 4 a. Proliferative Endometrium

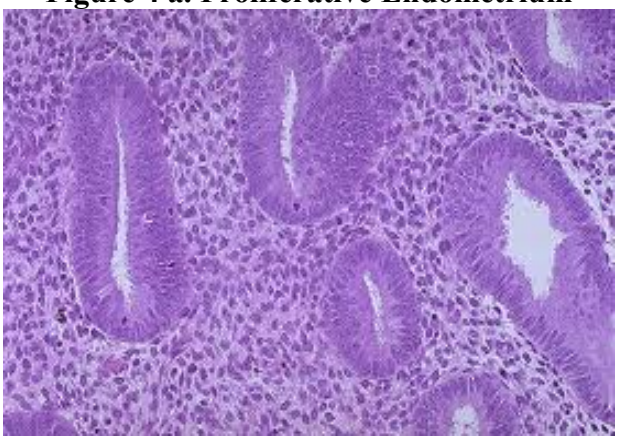


Figure 4 b . Secretory Endometrium

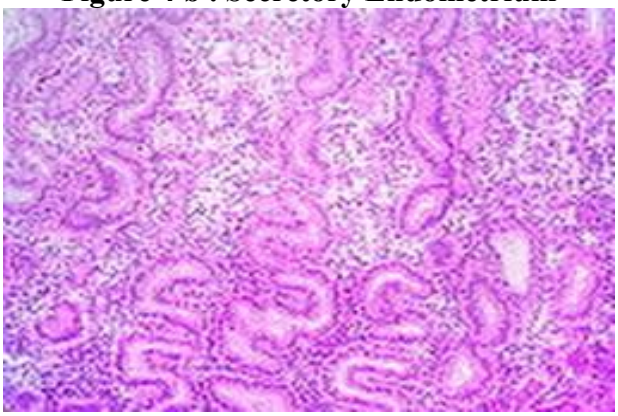


Figure 4 c. Endometrial Polyp

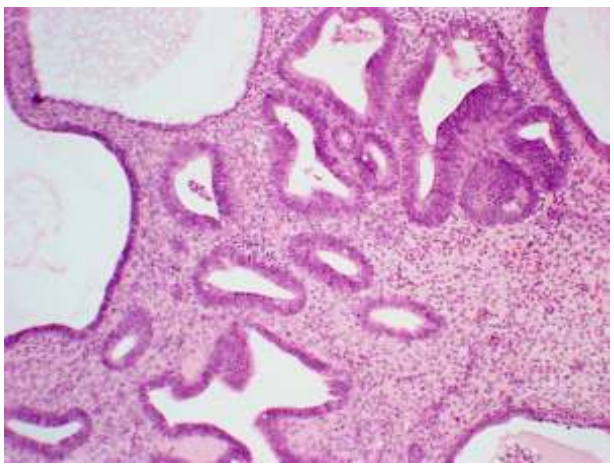


Figure 5a.Endometrial Hyperplasia

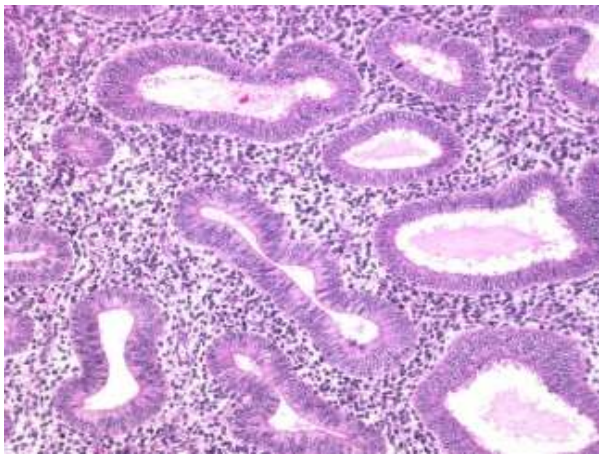


Figure 5b. Disordered proliferative Endometrium

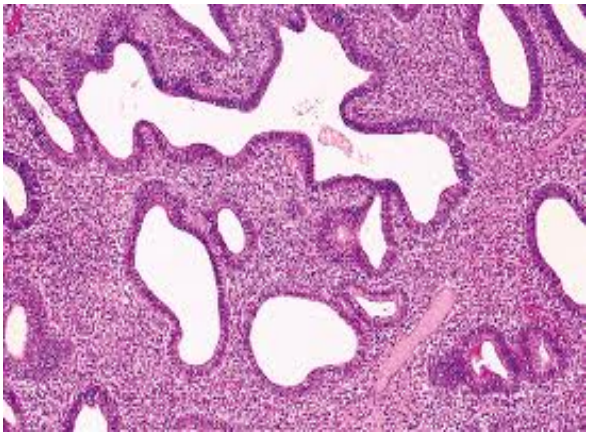
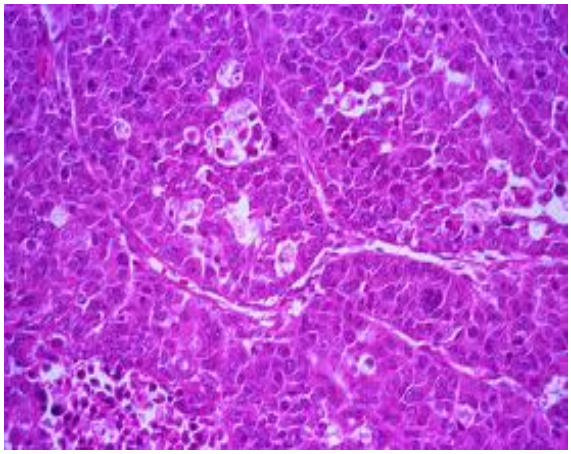


Figure 5c .Endometrial Adenocarcinoma



RESULTS AND ANALYSIS

Hundred cases were included in the study period from 01/7/2011 to 31/07/2012. All the patients underwent Pipelle endometrial sampling and dilatation and curettage.

Table .7 Age distribution of the study sample

Age group – years	No. of patients	Percentage (%)
30-35	13	13
36-40	29	29
41-45	30	30
46-50	18	18
≥51	10	10
Total	**100**	**100**

Patients between 41-45 years constituted the maximum in our study.

Figure.6 Age of the study group

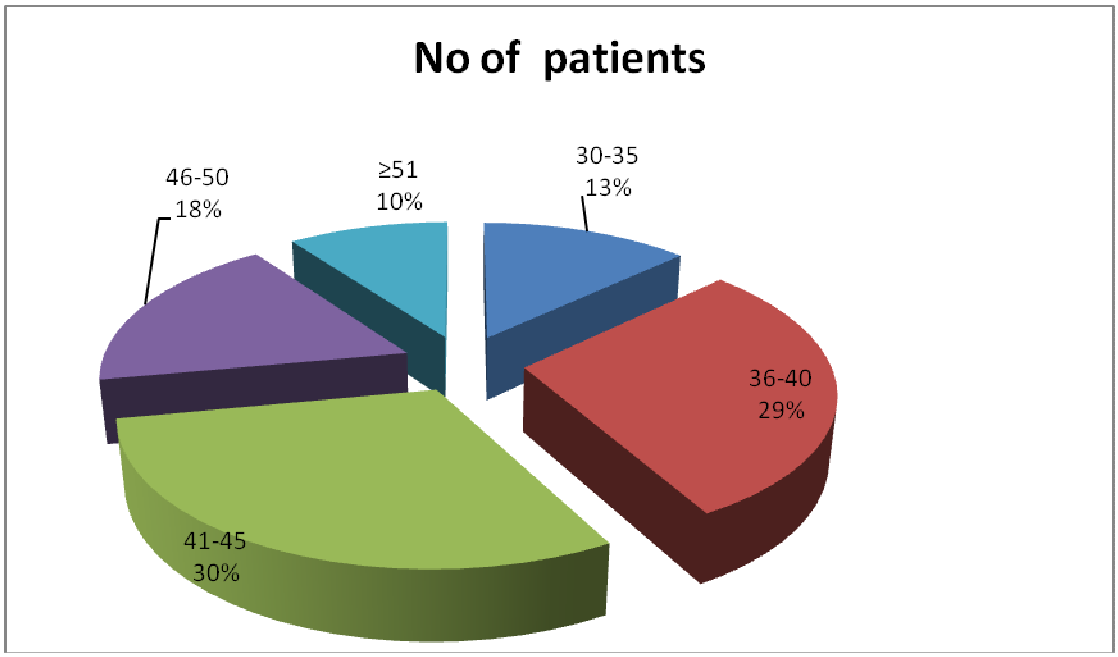


Table 8. Menopausal status of the patients

	No. of patients	**Percentage (%)**
Premenopausal	70	70
Postmenopausal	30	30
Total	**100**	**100**

Of the study group 70% (n=70) were premenopausal whereas 30% were postmenopausal (n=30).

Figure .7 Menopausal status

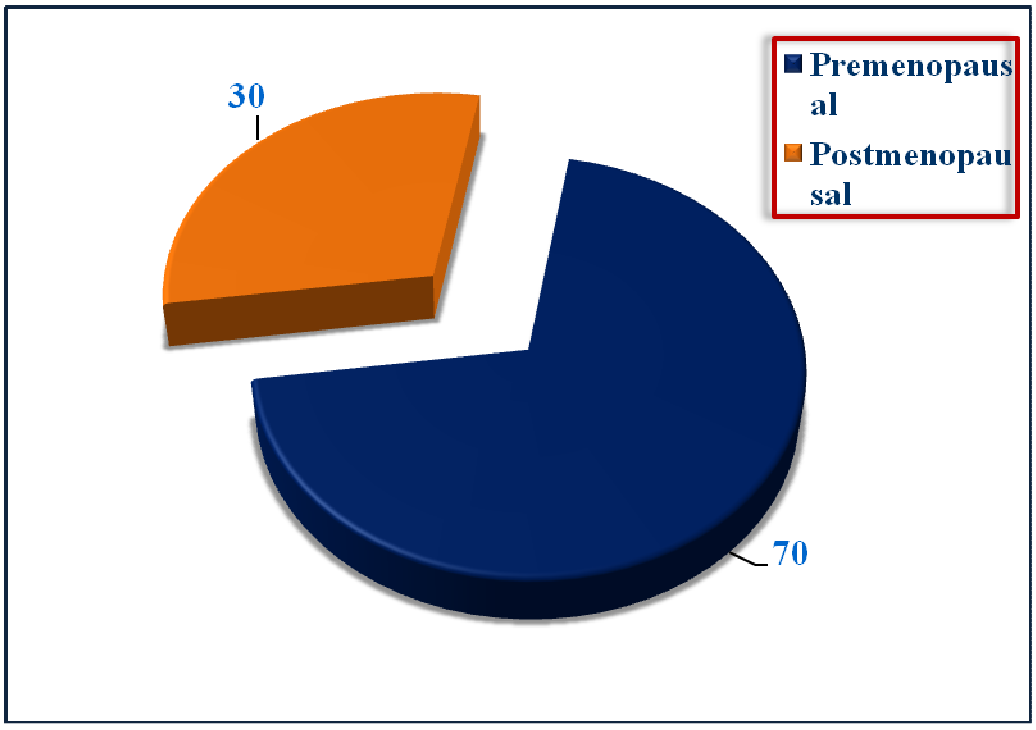


Table 9.Presenting complaints of the patients

Complaints	No. of Patients	Percentage (%)
Post menopausal bleeding	30	30%
Menorrhagia following amenorrhea	10	10%
Menorrhagia	28	28%
Metrorrhagia	20	20%
Menometrorrhagia	12	12%
Total	**100**	**100%**

Premenopausal patients included in this study had menorrhagia as their main complaint. Irregular bleeding was the second most common complaint in this group. Most of the Postmenopausal patients had postmenopausal bleeding as their complaint.

Figure.8 Presenting complaints

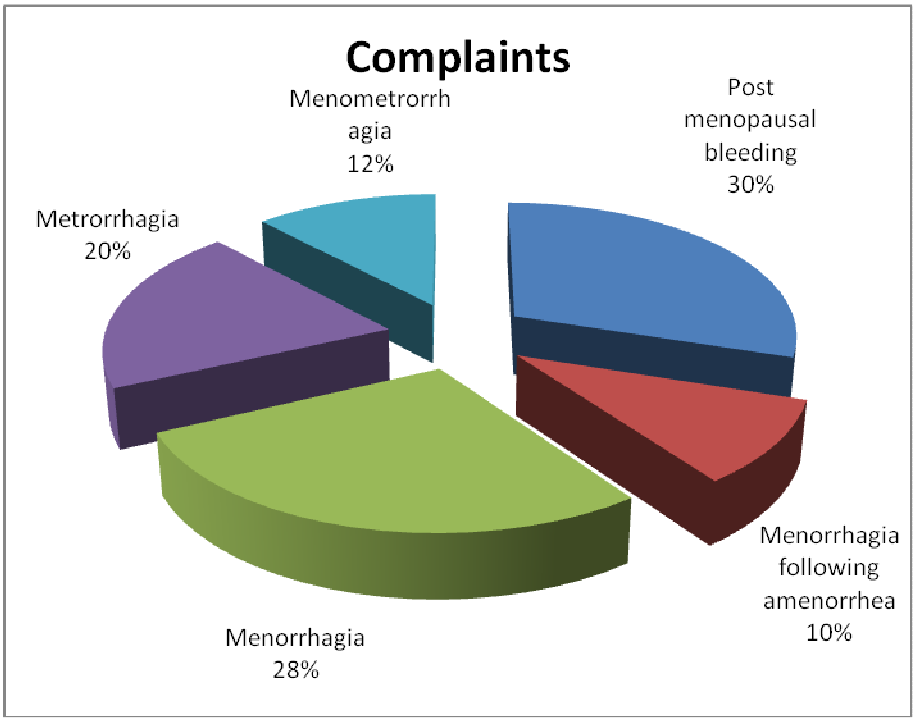
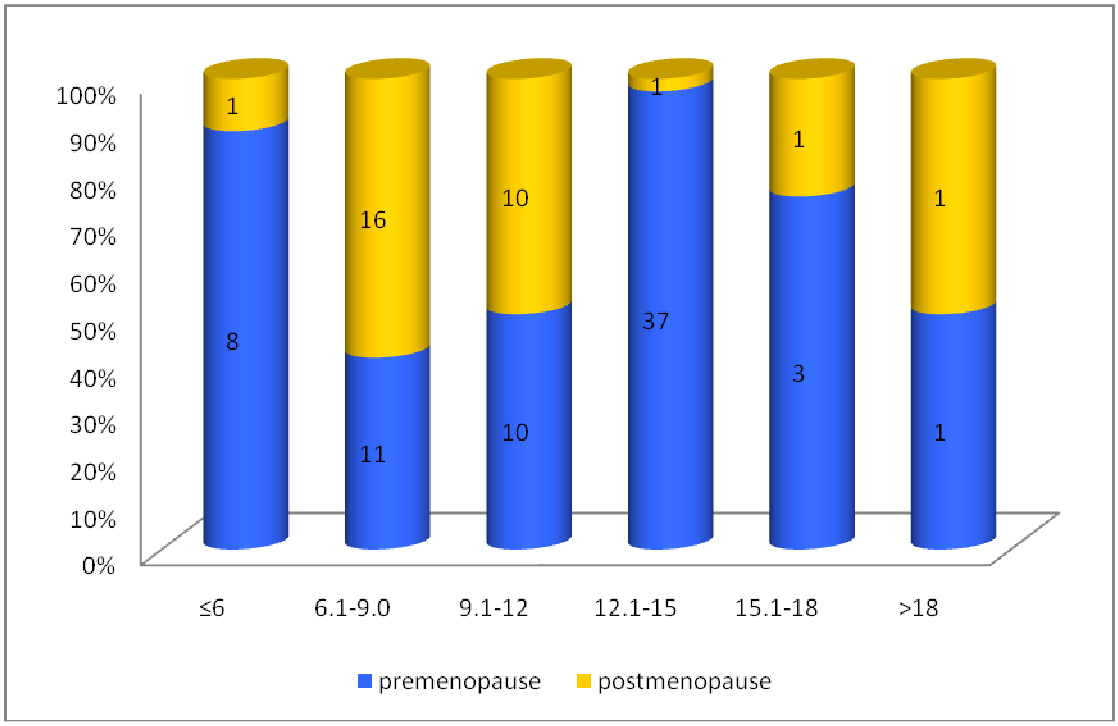


Table 10. Distribution of patients in relation to endometrial thickness and menopausal status.

Endometrial thickness (mm)	Premenopausal	Postmenopausal	Total
≤6	8	1	9
6.1-9.0	11	16	27
9.1-12.0	10	10	20
12.1-15.0	37	1	38
15.1-18.0	3	1	4
>18	1	1	2
Total	70	30	100

Of the premenopausal patients 51(72.85%) had an endometrial thickness of more than 9mm. In the postmenopausal patients 13(43.3%) had endometrial thickness more than 9 mm.

Figure.9 Distribution of patients in relation to endometrial thickness and menopausal status.



COMPARISON BETWEEN D & C AND PIPELLE SAMPLING

Table.11a HPR with Pipelle and D&C sampling

	HPR Obtained	**HPR not Obtained**
D&C	100(100%)	0
Pipelle	88(88%)	12(12%)

Table.11b Sample adequacy with Pipelle and D&C

	Sufficient sample	Insufficient sample
D&C	100(100%)	0
Pipelle	72(72%)	28(28%)

HPR was available in 88 of 100 patients in Pipelle. It was available in all cases of D&C.

On subjective perception, sufficient sample with Pipelle was obtained in 72 patient (72%) and 28 patient had insufficient sample(28%).Following D&C, sufficient sample was obtained in all 100 patient (100%). Of the total 28 insufficient samples with Pipelle, HPR was available in 16 cases (57.2%). Of the remaining 12 patients, some amount of endometrial tissue was present in 11 cases, but it was inadequate for the histopathologist to give a comment.

Figure.10a) HPR with Pipelle and D&C sampling

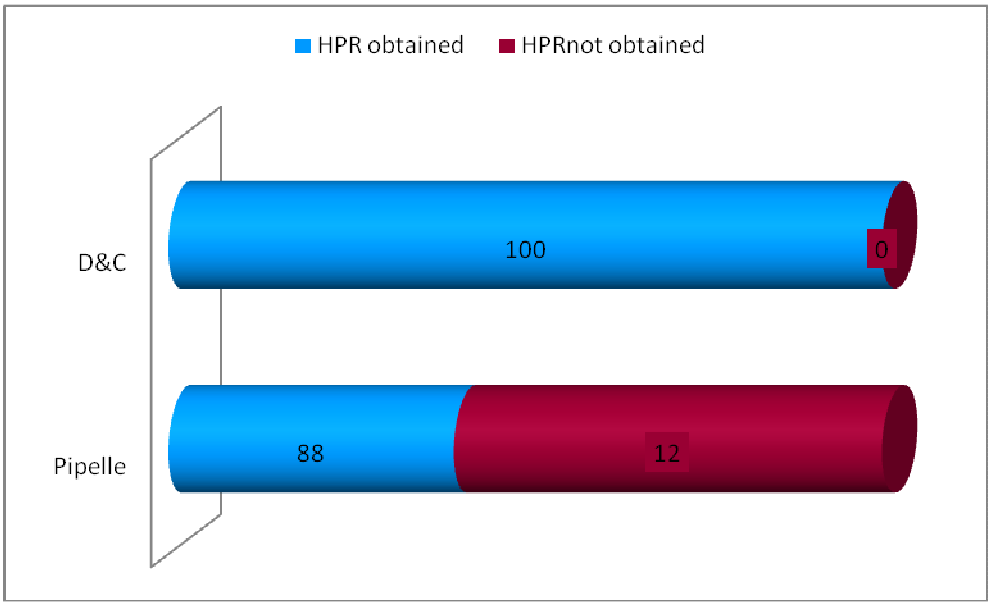


Figure.10b) Sample adequacy with Pipelle and D&C

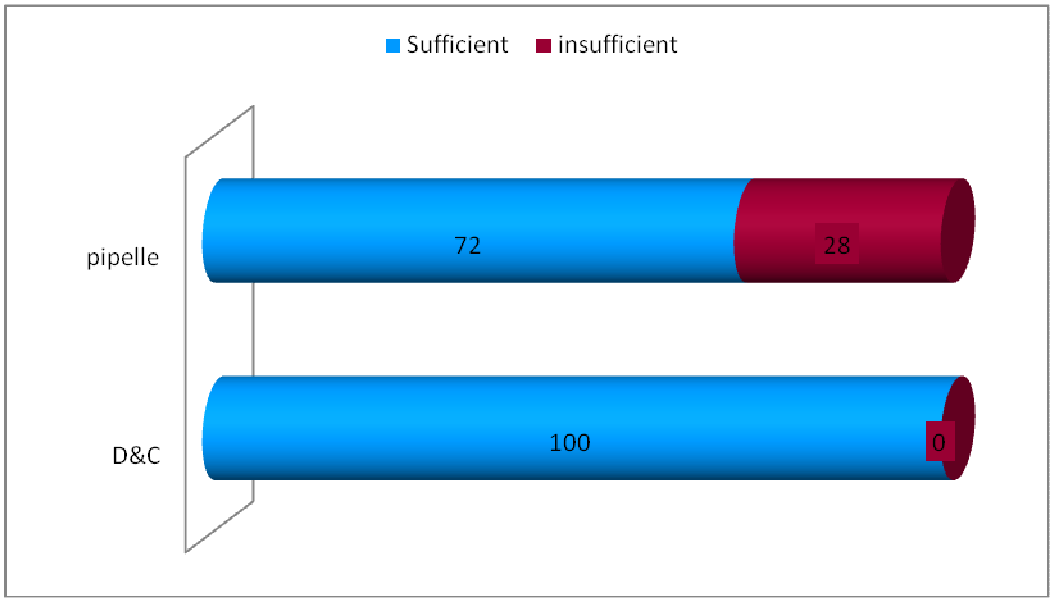


Table 12. Specific Histopathological condition reported with Pipelle and D&C

Sample report	**D&C**	**PIPELLE**
Adenocarcinoma	2(2%)	2(2%)
Atrophic endometrium	2(2%)	2(2%)
Complex hyperplasia	1(1%)	1(1%)
Disordered proliferative	24(24%)	24(24%)
Proliferative	38(38%)	30(30%)
Secretory	33(33%)	29(29%)
Blood clot	0	1(1%)
Scanty endometrium	0	11(11%)
Total	**100(100%)**	**100(100%)**

From analyzing the histopathological report obtained from Pipelle it became evident that except in one case, all other procedures, 99 out of 100 procedures, were successful in collecting atleast some tissue from endometrium (99%). D&C was successful in collecting endometrium in all patients.

When comparing the reports of HPE between the D&C and Pipelle sampling, no case of endometrial adenocarcinoma or endometrial hyperplasia were missed out in Pipelle's sampling.There was no discrepancy in the reports obtained from both types of sampling.

Of those 12 cases in Pipelle, where histopathology report was not available, D&C showed the following reports. 4 of them showed secretory endometrium. Remaing showed proliferative endometrium with polypoidal changes.

Figure11. Specific Histopathological Reports

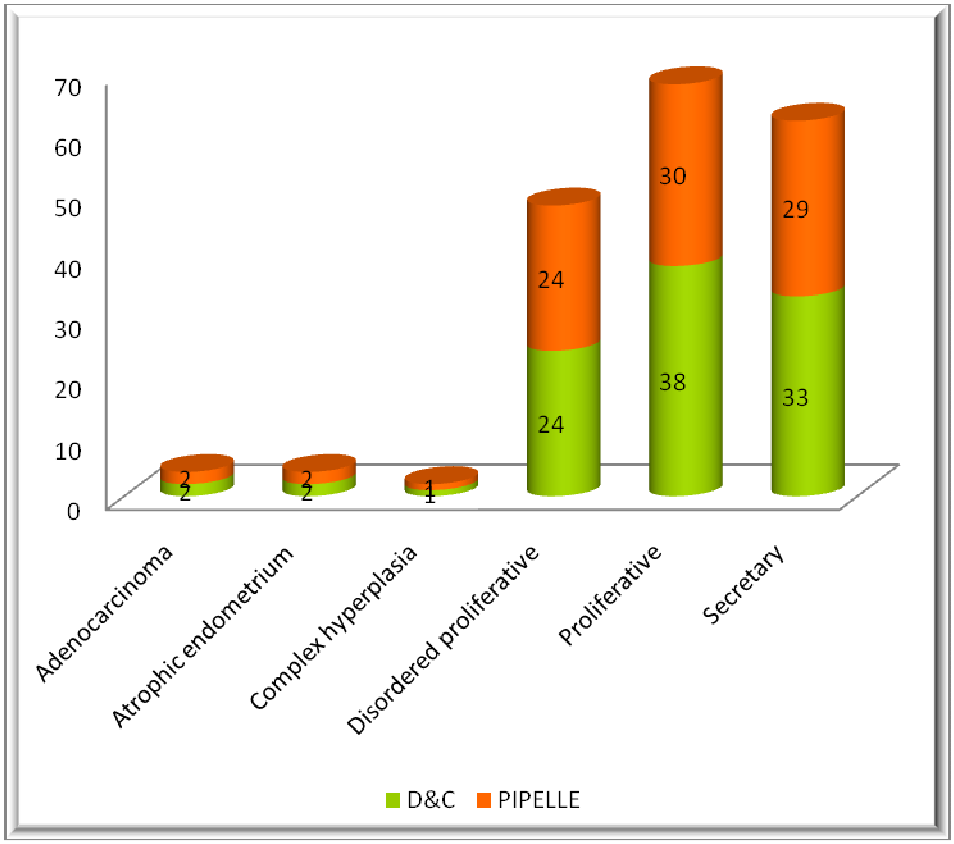


Table 13. Validity of Pipelle endometrial sampling for each endometrial condition

Validity of Pipelle's	Sensitivity	Specificity	Positive predictive Value	Negative predictive value
Adenocarcinoma	100%	100%	100%	100%
Hyperplasia	100%	100%	100%	100%
Proliferative	78.9%	100%	100%	88.5%
Secretory	87.8%	100%	100%	94.3%
Atrophic	100%	100%	100%	100%

Pipelle sampling showed 100% sensitivity and specificity with regards to diagnosis of carcinoma, hyperplasia and atrophic endometrium. With regard to secretory endometrium the corresponding values were 87.8% and 100%. Whereas PPV, NPV were 100% and 94.3% respectively. Similarly, for proliferative endometrium sensitivity, specificity, positive predictive value and negative predictive value were 78.9%, 100%, 100%, 88.5% respectively.

FACTORS INFLUENCING THE FEASIBILITY AND EFFICACY OF PIPELLE SAMPLING

Endometrial Sampling Procedure with Pipelle

Endometrial sampling procedure was termed subjectively as easy or tough by the doctor who performed the procedure, taking into consideration the time taken for the procedure and the discomfort it caused for the patient.

Table 14. Ease of procedure with menopausal status

Menopause vs Sampling			Menopause		
			Postmenopause	Premenopause	Total
Sampling	Easy	Count	29	66	95
		% within Sampling	30.5%	69.5%	100.0%
		% within menopause	96.7%	94.3%	95.0%
		% of Total	29.0%	66.0%	95.0%
	Tough	Count	1	4	5
		% within Sampling	20.0%	80.0%	100.0%
		% within menopause	3.3%	5.7%	5.0%
		% of Total	1.0%	4.0%	5.0%
	Total	Count	30	70	100
		% within Sampling	30.0%	70.0%	100.0%
		% within menopause	100.0%	100.0%	100.0%
		% of Total	30.0%	70.0%	100.0%

Of all, only 5 were tough. Others were easy. Since the percentage is less(5%) it is difficult to make statistically significant inference from this analysis. 4 of the 70 premenopausal patients had difficult procedure (5.7%), whereas it was one out of the 30 among postmenopausal patients (3.3%). χ^2 = 0.2519 and the p value 0.617 which was >0.05. So the observed difference in the ease of procedure according to menopausal status was not statistically significant.

Figure 12. Relationship of menopausal status with ease of procedure

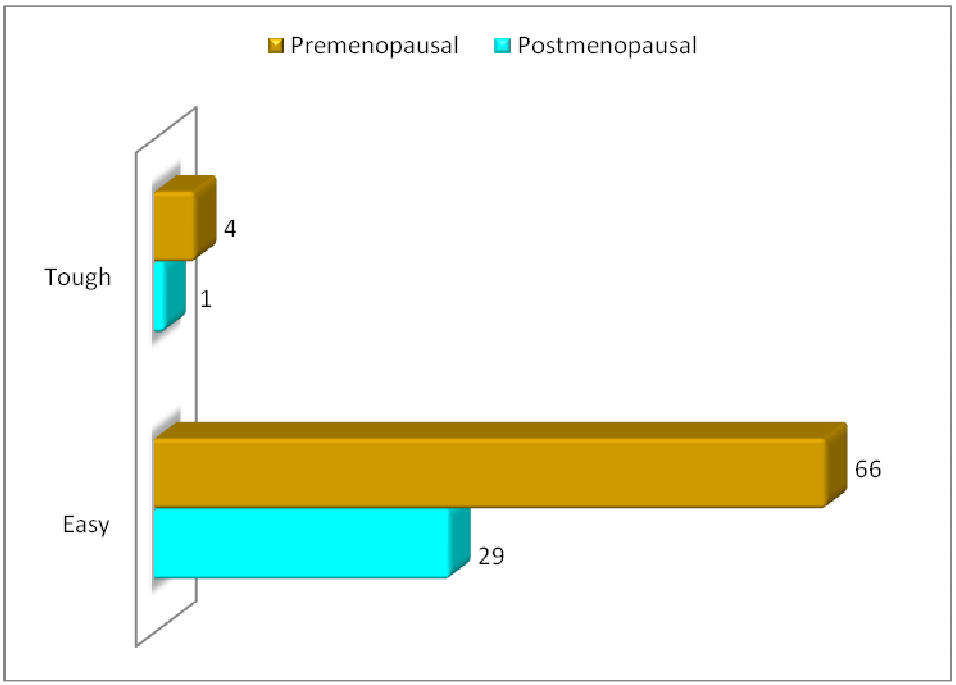


Table 14.Relationship of ease of procedure with mode of delivery

Parity vs Sampling			Sampling		
			Easy	**Tough**	**Total**
Parity	**Nulliparous**	Count	3	2	5
		% within Parity	60.0%	40.0%	100.0%
		% within Sampling	3.2%	40.0%	5.0%
		% of Total	3.0%	2.0%	5.0%
	1	Count	13	0	13
		% within Parity	100.0%	.0%	100.0%
		% within Sampling	13.7%	.0%	13.0%
		% of Total	13.0%	.0%	13.0%
	2	Count	54	3	57
		% within Parity	94.7%	5.3%	100.0%
		% within Sampling	56.8%	60.0%	57.0%
		% of Total	54.0%	3.0%	57.0%
	≥3	Count	25	0	25
		% within Parity	100.0%	.0%	100.0%
		% within Sampling	26.3%	.0%	25.0%
		% of Total	25.0%	.0%	25.0%
	Total	Count	95	5	100
		% within Parity	95.0%	5.0%	100.0%
		% within Sampling	100.0%	100.0%	100.0%
		% of Total	95.0%	5.0%	100.0%

Chi square and p value of the above table are $\chi^2 = 14.903$ & p=0.002 respectively. Since the p value was < 0.05 it was statistically significant**.** Among nulliparous women tough sampling was seen in 40%. Among parous women those who delivered twice tough sampling was seen in 5.3%.

Figure 13. Ease of procedure with parity.

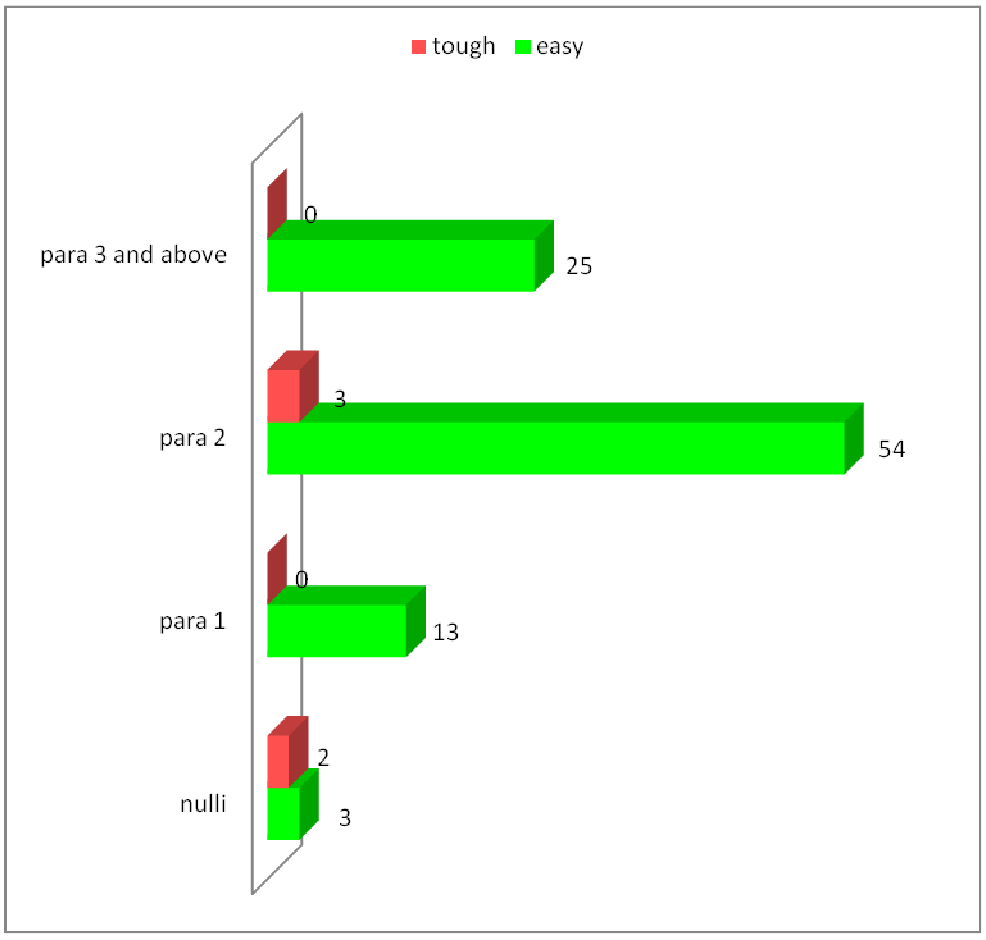


Table 15. Relationship between mode of delivery and ease of procedure

Sampling vs Delivery			Sampling		
			Easy	**Tough**	**Total**
Delivery	**CS**	Count	8	0	8
		% within Delivery	100.0%	.0%	100.0%
		% within Sampling	8.4%	.0%	8.0%
		% of Total	8.0%	.0%	8.0%
	FTND	Count	84	3	87
		% within Delivery	96.6%	3.4%	100.0%
		% within Sampling	88.4%	60.0%	87.0%
		% of Total	84.0%	3.0%	87.0%
	Nullipa rous	Count	3	2	5
		% within Delivery	60.0%	40.0%	100.0%
		% within Sampling	3.2%	40.0%	5.0%
		% of Total	3.0%	2.0%	5.0%
Total		Count	95	5	100
		% within Delivery	95.0%	5.0%	100.0%
		% within Sampling	100.0%	100.0%	100.0%
		% of Total	95.0%	5.0%	100.0%

Chi square and the p value of the above table was χ^2=13.757& p =0.001 respectively.since the p value was < 0.05 it was statistically significant. Nulliparous constituted 40% of the tough procedure. 3.4% of those who delivered normally had tough procedure.

Figure14. Relationship of Ease of procedure with mode of delivery

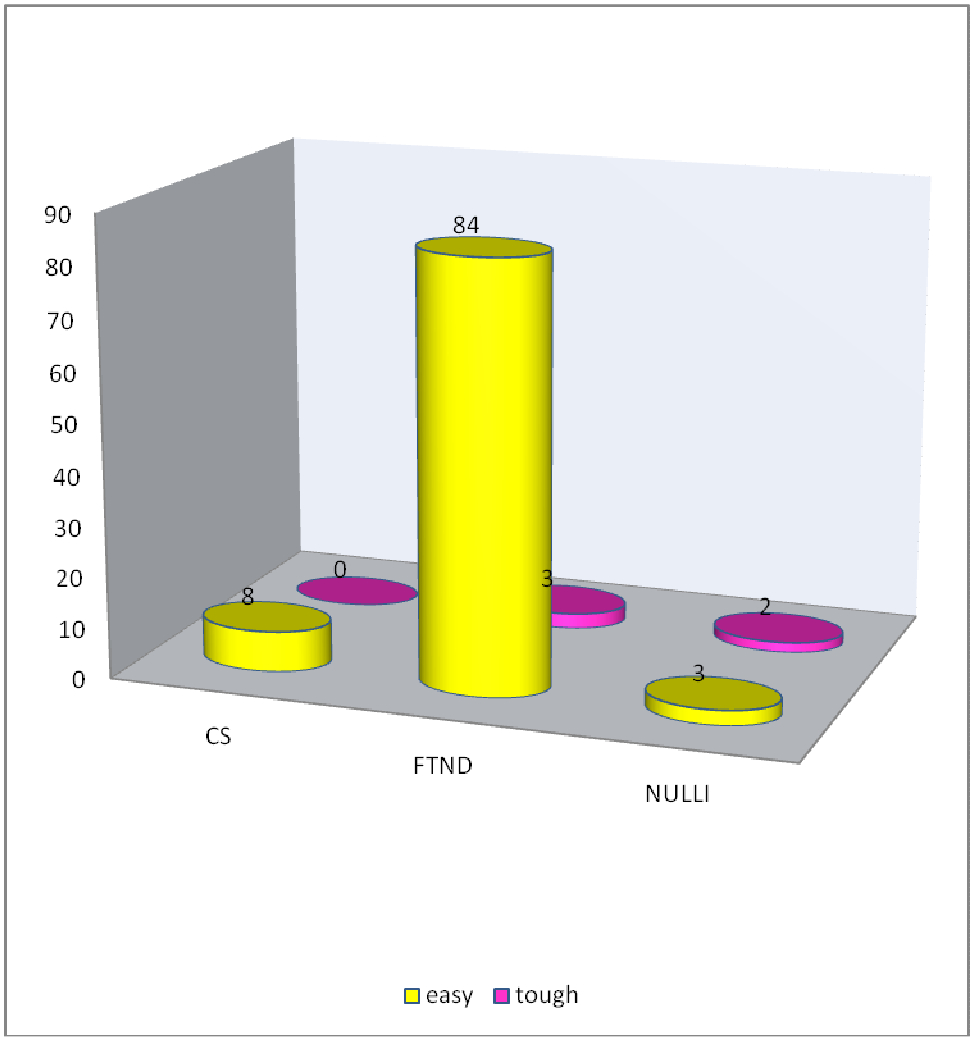


Table 16. Relationship between the ease of procedure and HPR

Sampling vs HPR			HPR		
			Obtained	Not obtained	Total
Sampling	**Easy**	Count	83	12	95
		% within Sampling	87.4%	12.6%	100.0%
		% within code-HPR	94.3%	100.0%	95.0%
		% of Total	83.0%	12.0%	95.0%
	Tough	Count	5	0	5
		% within Sampling	100.0%	.0%	100.0%
		% within code-HPR	5.7%	.0%	5.0%
		% of Total	5.0%	.0%	5.0%
	Total	Count	88	12	100
		% within Sampling	88.0%	12.0%	100.0%
		% within code-HPR	100.0%	100.0%	100.0%
		% of Total	88.0%	12.0%	100.0%

Easy procedure does not always mean that a histopathology report will be obtained. As observed in our study, of the 95 procedures termed easy, HPE report was not obtained in 12 cases.The chi-square test value was χ^2=0.718 and the p value was 0.397.Since p value was > 0.05 the difference was not statistically significant.

Figure 15. Relationship between ease of procedure with HPR

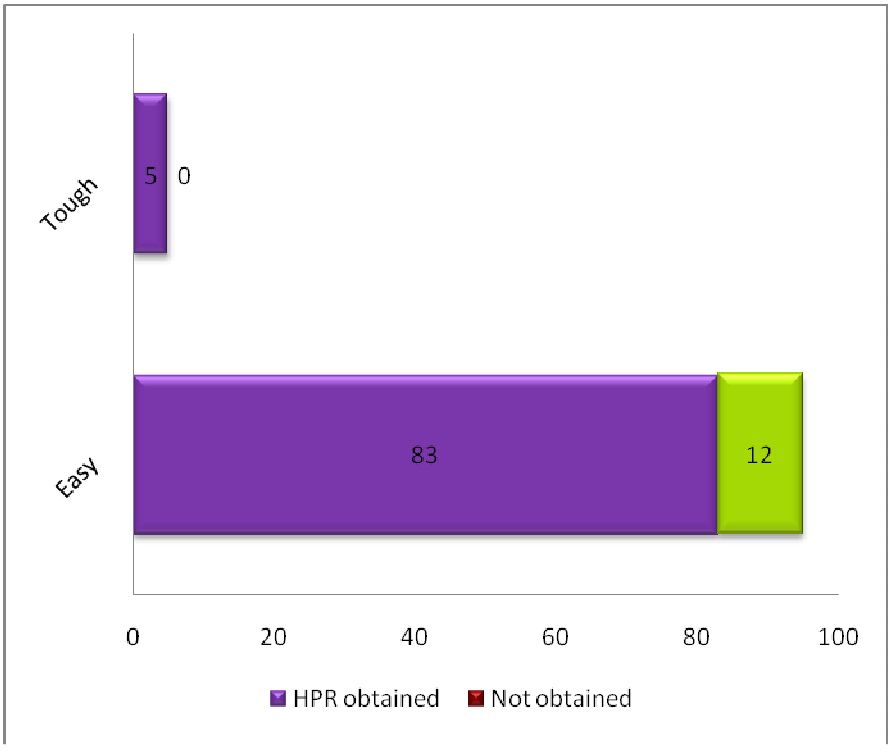


Table 17.Relationship of ease of procedure with sample sufficiency

Sampling vs Procedure			Procedure		
			Easy	Tough	Total
Sample	Sufficient	Count	67	5	72
		% within Sample	93.1%	6.9%	100.0%
		% within procedure	70.5%	100.0%	72.0%
		% of Total	67.0%	5.0%	72.0%
	Scanty	Count	28	0	28
		% within Sample	100.0%	.0%	100.0%
		% within procedure	29.5%	.0%	28.0%
		% of Total	28.0%	.0%	28.0%
	Total	Count	95	5	100
		% within sample	95.0%	5.0%	100.0%
		% within procedure	100.0%	100.0%	100.0%
		% of Total	95.0%	5.0%	100.0%

An easy procedure doesn't always result in obtaining an adequate sample. Among the easy procedures sufficient sample was not obtained in 28 of 95 procedures (29.4%). Though the procedure was termed tough, sufficient sample was obtained in all of the five cases.

Figure 16.Relationship between ease of procedure with sample adequacy

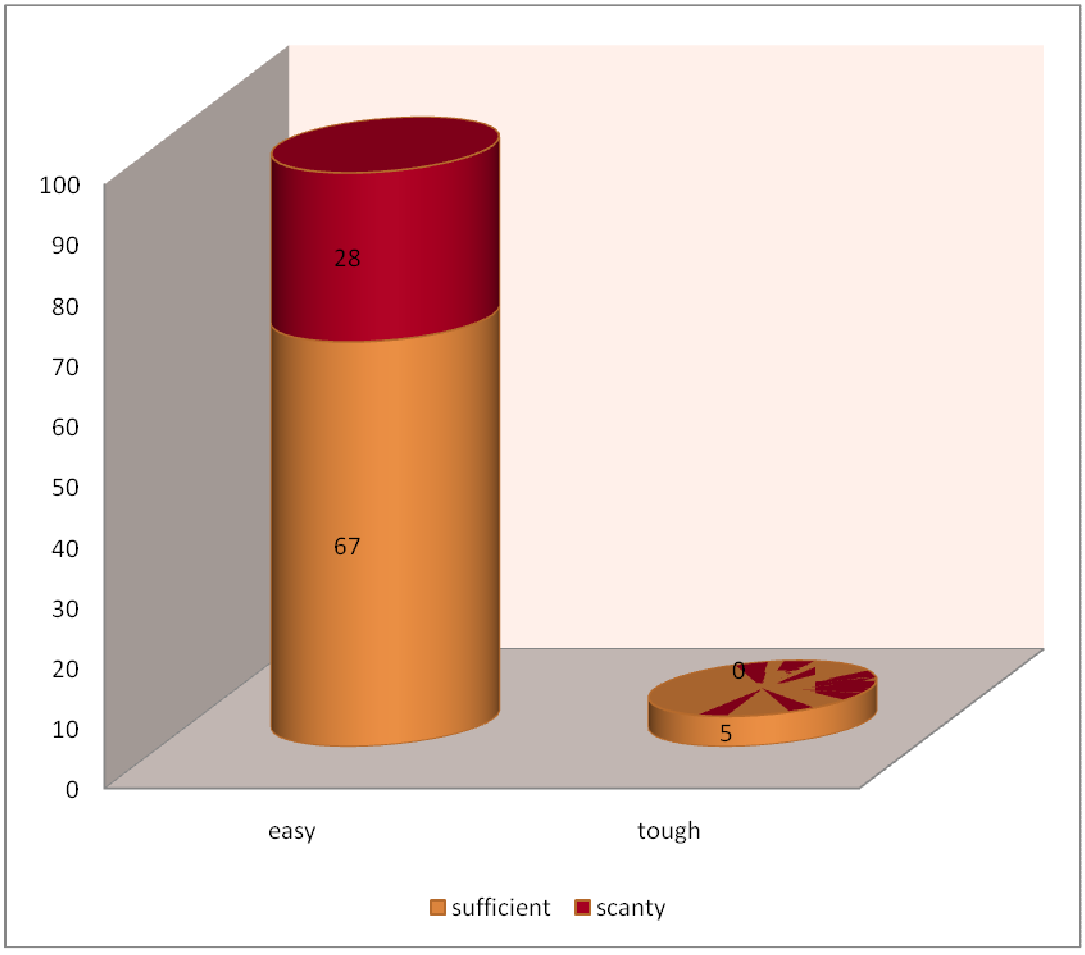


Table 18. Relationship of age with obtaining sufficient sample

Age vs. Sampling			Sampling		
			Sufficient	**Scanty**	**Total**
Age	**≤50**	Count	67	23	90
		% within age	74.4%	25.6%	100.0%
		% within sampling	93.1%	82.1%	90.0%
		% of Total	67.0%	23.0%	90.0%
	>50	Count	5	5	10
		% within age	50.0%	50.0%	100.0%
		% within sampling	6.9%	17.9%	10.0%
		% of Total	5.0%	5.0 %	10.0%
	Total	Count	72	28	100
		% within age	72.0%	28.0%	100.0%
		% within sampling	100.0%	100.0%	100.0%
		% of Total	72. 0%	28%	100.0%

It was expected that inadequate sample will be associated with increasing age. In this study also, age group above 50 years had sample inadequacy rate of 50.0%. It was only 25.6% in the age group of less than or equal to 50 years.

Figure 17.Relationship of age with adequacy of sample.

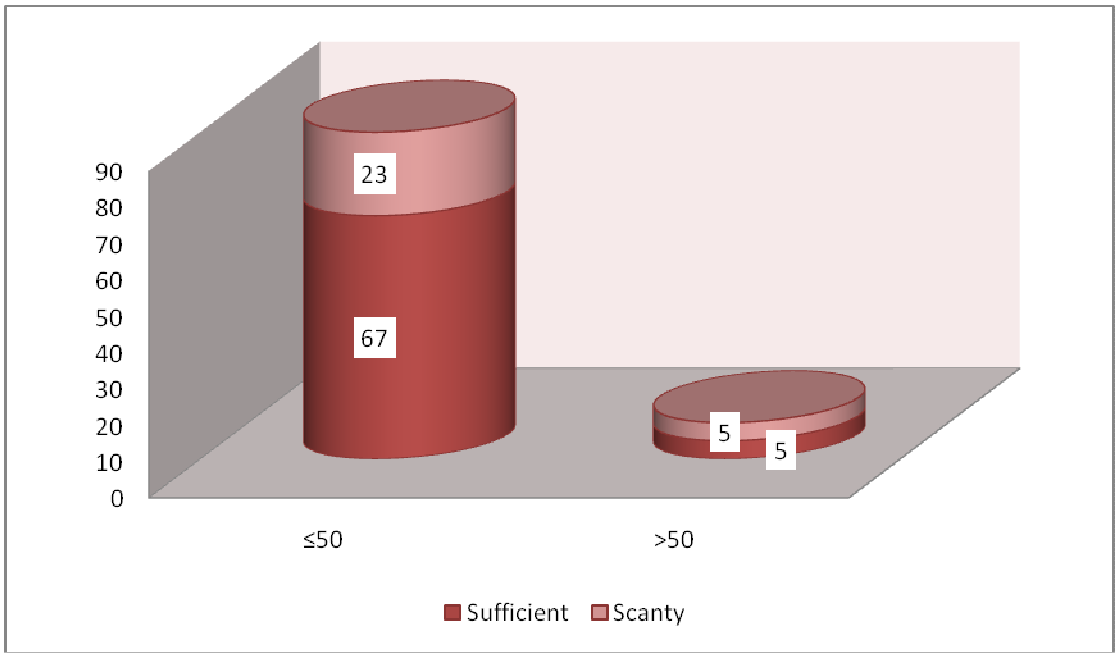


Table 19 Relationship of menopausal status with obtaining sufficient sample

Menopause vs Tissue Sample			Menopause		
			Postmenopause	Premenopause	Total
Tissue Sample	Sufficient	Count	16	56	72
		% within Tissue Sample	22.2%	77.8%	100.0%
		% within Premenopause	53.3%	80.0%	72.0%
		% of Total	16.0%	56.0%	72.0%
	Scanty	Count	14	14	28
		% within Tissue Sample	50.0%	50.0%	100.0%
		% within Postmenopause	46.7%	20.0%	28.0%
		% of Total	14.0%	14.0%	28.0%
Total		Count	30	70	100
		% within Tissue Sample	30.0%	70.0%	100.0%
		% within Menopause	100.0%	100.0%	100.0%
		% of Total	30.0%	70.0%	100.0%

If the patient is premenopausal the procedure yielded sufficient sample in 77.8% of the patients, whereas it gave sufficient sample only in 50% of the patients if they were postmenopausal.The chi-square test value was χ^2= 7.407 and the p value was 0.006. Since the p value was <0.05, the observed difference in the sample sufficiency in relation to the menopausal status of the patient was statistically significant.

Figure 18.Relationship of menopausal status with obtaining sufficient sample

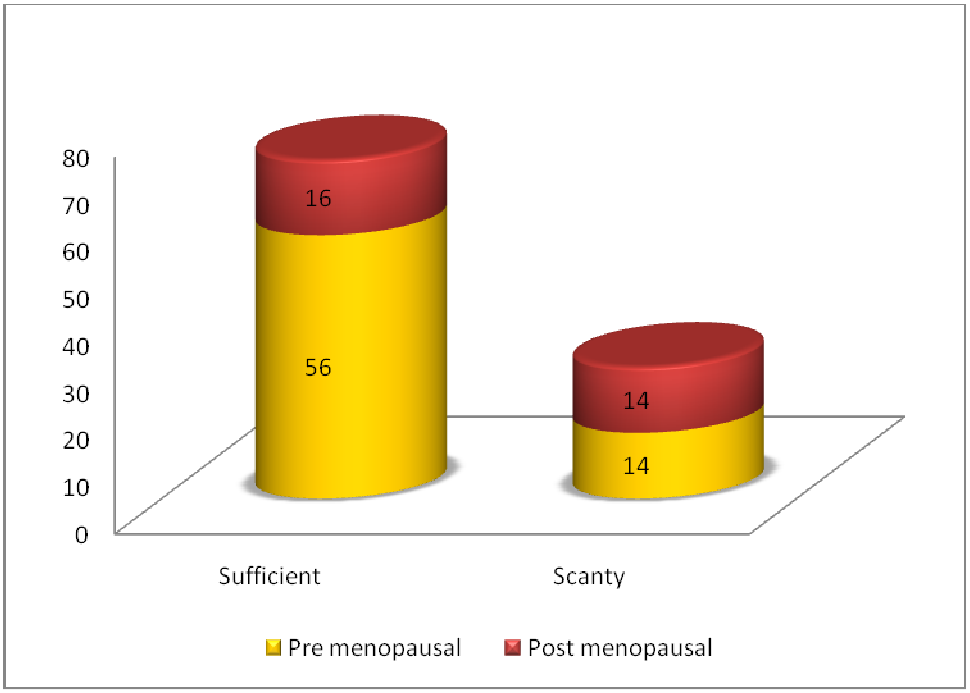


Table 20.Relationship between adequacies of sample with HPR

HPR vs Tissue Sample			HPR		
			Obtained	Not Obtained	Total
Tissue Sample	**Sufficient**	Count	72	0.0	72
		% within Tissue Sample	100.0%	0	100.0%
		% within HPR	81.8%	0.0%	72.0%
		% of Total	72.0%	0.0%	72.0%
	Scanty	Count	16	12	28
		% within Tissue Sample	57.1%	42.9%	100.0%
		% within HPR	18.2%	100.0%	28.0%
		% of Total	16.0%	12.0%	28.0%
	Total	Count	88	12	100
		% within Tissue Sample	88.0%	12.0%	100.0%
		% within HPR	100.0%	100.0%	100.0%
		% of Total	88.0%	12.0%	100.0%

Sufficient sample always gives the histopathology report. In our study also histopathology report was obtained with all sufficient samples (72). Of the 28 procedures termed scanty sample, histopathology report was obtained in only 16 samples (57.2%). The chi-square test value was χ^2=35.065 and the p value was less than 0.05.So the observed difference in the sample sufficiency in relation to the HPE report was statistically significant.

Figure19.Reports of Scanty sample with Pipelle

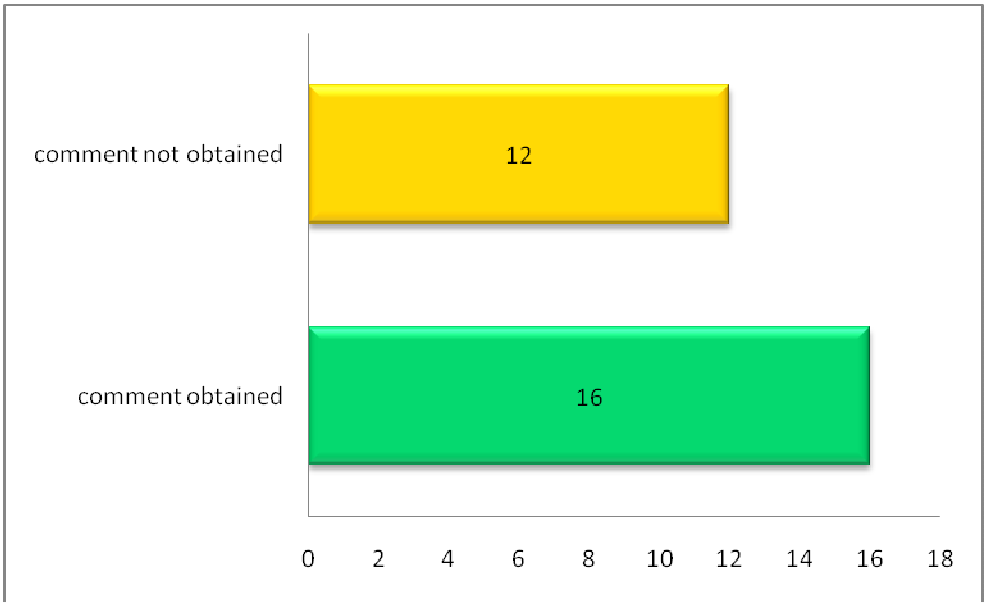


Table 21.Relationship of menopausal status with HPR

Menopause	Obtained	Not obtained
Premenopausal	64	6
Postmenopausal	24	6
Total	41	12

70 premenopausal patients HPR was available in 64 patients (91.4%). But of the 30 post menopausal patients, report was available only in 24 (80%). Applying the chi square test χ^2=2.597, the p value was 0.107. Since p value is more than 0.05 the difference is not statistically significant.

Figure 20. Relationship of menopausal status with HPR

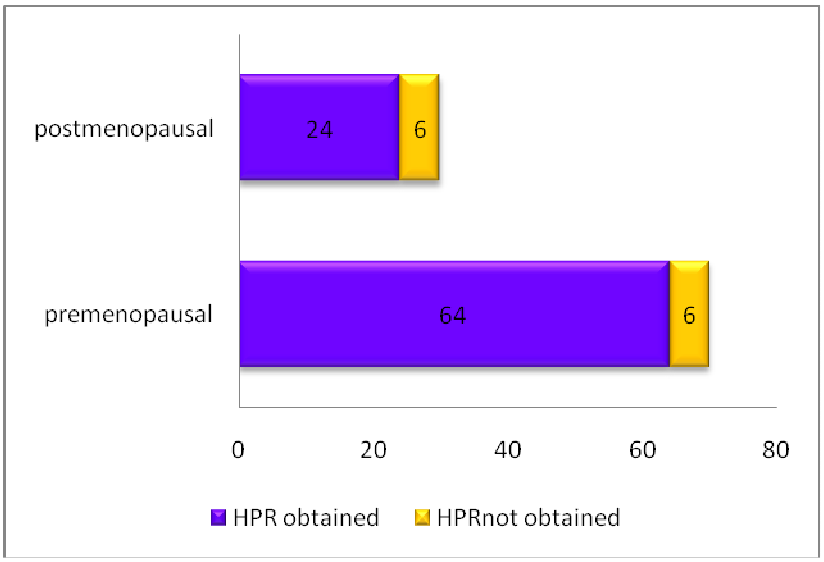


Table 22. ROC curve-Histopathology report

Variable	ET
Classification variable	HPR OBTAINED ,HPR NOT OBTAINED

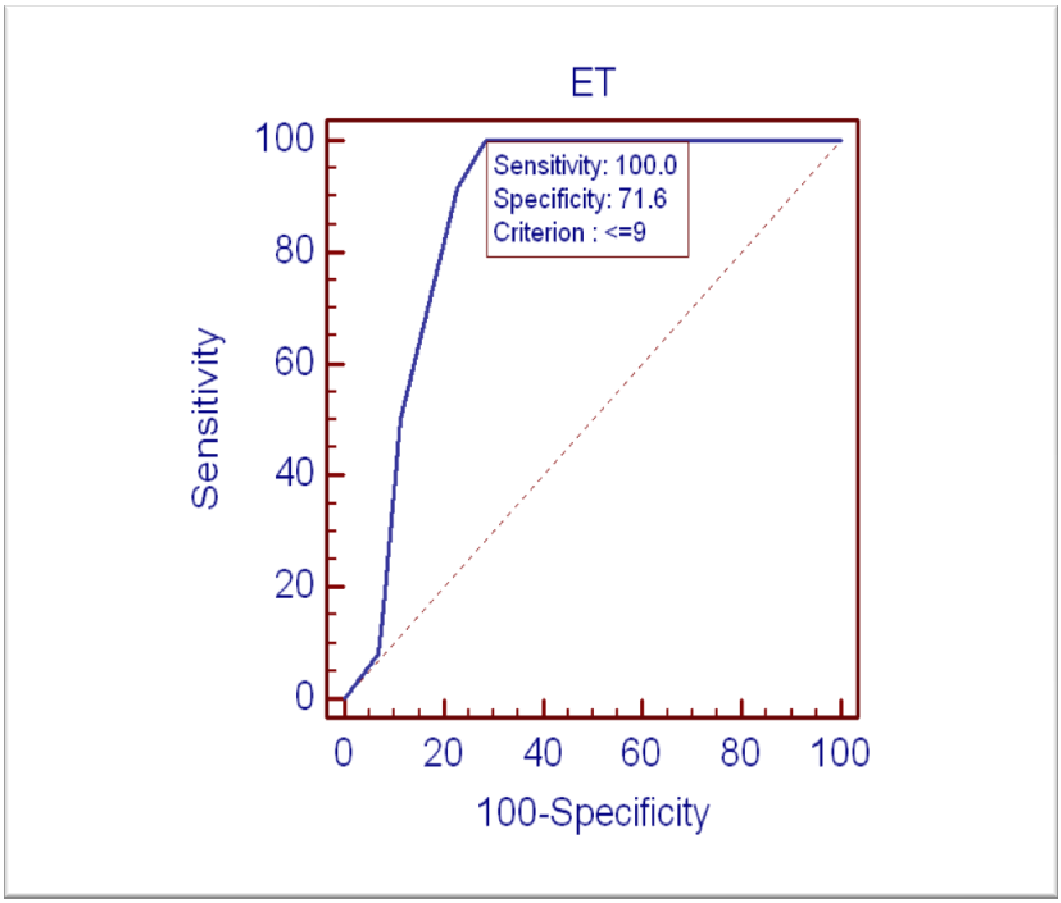
Sample size		100
Positive group	HPR obtained	88
Negative group	HPR not obtained	12

Significance level P (Area=0.5)	<0.0001

Area under the ROC curve (AUC	0.866
Standard Error[a]	0.0348
95% Confidence interval	0.784 to 0.926
Significance level P (Area=0.5)	<0.0001

ROC curves were plotted to define the cut–off value for endometrial thickness which would enable successful histopathology reporting. In our studies the best cut-off value to predict the successful histopathology reporting of samples was 9mm.

Figure 21. ROC curve for endometrial thickness


ET
Sensitivity: 100.0
Specificity: 71.6
Criterion : <=9
Sensitivity
100
80
60
40
20
0
0
20
40
60
80
100
100-Specificity

DISCUSSION

The most commonly used endometrial sampling methods are D&C and Pipelle sampling. In the majority of studies, the ability to diagnose endometrial carcinoma was used as a scale to assess the success rate of each method. When analyzing the various studies which compared the results of both D&C and Pipelle sampling, the Pipelle sampling was as effective and safe in diagnosing the endometrial lesions including hyperplasia and malignancy. The prime aim of our study is to evaluate Pipelle's sampling as an effective, economic, safe and acceptable outpatient procedure.

Demirkiran et al [58] followed a group of 673 patients who were evaluated with Pipelle endometrial biopsy, D&C and hysterectomy from 2007-2009. 478 patients underwent Pipelle and D&C, 212 patients underwent Pipelle and hysterectomy and 161 patients underwent D&C and hysterectomy. Pipelle biopsy and D&C specimens were compared with regard to histopathological report of each other and compared with hysterectomy specimens. They evaluated the statistically concordant rate with each other. They found 67% between Pipelle and hysterectomy and 70% between D&C and hysterectomy. Sensitivity of Pipelle biopsy in

detection of hyperplasia and aytpia was 67% and 75% respectively.

Sensitivity of D&C for detecting hyperplasia and atypia was 62% and 83 %. NPV of pipelle biopsy and D&C was 99 % for malignancy. They concluded that Pipelle biopsy and D&C showed almost equal success rate in the diagnosis of endometrial pathologies. No method is adequate for diagnosing focal endometrial pathologies. Pipelle biopsy is a cheaper and easier method.

Fakhar et al[46] evaluated 100 patient with AUB. D&C and pipelle were chosen as a method for sampling the endometrium and histopathology report were compared taking D&C as a gold standard. In 98 of the 100 patients the sample was adequate as compared to 100 in D&C. Diagnosis of carcinoma, hyperplasia and secretory endometrium with pipelle showed a sensitivity and specificity of 100%. Sensitivity and specificity for diagnosing proliferative endometrium was 94%,93% respectively. Two samples were inadequate by Pipelle. In both these cases D&C report showed polyp.The conclusion derived was that hyperplasia and malignancy could be detected with high sensitivity and specificity using Pipelle technique.

Tanriverdi et al[59] studied the accuracy of the Pipelle sampling among 127 patients and compared it with dilatation and curettage. They concluded that Pipelle sampling should not be recommended for those patients who carry an increased risk for endometrial carcinoma.

In our study we could obtain sufficient samples in 88 cases using Pipelle device, whereas with D&C we could obtain adequate sample in all 100 cases. Histopathological findings of both the procedures were comparable. 100% sensitivity and specificity was obtained in diagnosing endometrial carcinoma and hyperplasia, which was comparable to the observation made by Fakhar and Saeed.

Various factors contribute towards assessing the efficacy of Pipelle device as an outpatient procedure, in sampling the endometrium.

Sufficient sample as from histopathology report

It was observed from our study that a histopathology report was available in 88 of the 100 case (88%). Other studies reported the success of Pipelle in obtaining an adequate sample to vary from 67% to 90.6%.

Table 23 . Success in obtaining sufficient sample with Pipelle

Study	Year	No of patients	Insufficient sample	Success
Machadoeta al[60]	2003	1535	16.09%	83.91%
Ben-Baruch et al[45]	1994	172	9.4%	90.6%
Bakour et al [61]	2000	248	29.8%	70.20%
Gordon et al [62]	1999	100	33%	67%
Epstein et al [63]	2001	133	16%	84%
Total		**2228**		

Of the 5 studies analyzed (Table 22), the total number of failure in obtaining adequate specimen for HPE were 392. The combined failure

rate of all the studies came to 17.5%. The failure rate observed in our study was 12%, which was similar to the reported studies.

Gordon et al[62], in their study, reported an insufficient sample in 33 out of 100 women of which 19 were women with PMB (68%). Out of the 30 women with postmenopausal bleeding in our study 7 had insufficient sample (23.3%).

Bakour et al[61] followed up 74 patients of 248 women who had insufficient tissue at Pipelle endometrial sampling. None of them had endometrial cancer or hyperplasia. In our study also nobody had endometrial cancer or hyperplasia in whom insufficient sample was obtained by Pipelle.

Harmanliet al[64] (2004) studied endometrial samples that were reported as inadequate. NPV in diagnosing endometrial carcinoma and hyperplasia was evaluated in these samples. As NPV was high they concluded that an insufficient office endometrial sample may be sufficient to rule out endometrial carcinoma. In our study, of the 11 patients who had insufficient endometrium for histopathology with Pipelle device, none of them had endometrial hyperplasia or carcinoma when compared with the results obtained from D&C.

Age and adequate tissue at sampling

Williams et al[65] in his study found that samples obtained were inadequate in women over 54 years.

In our study (Table 18) age at or below 50 years was associated with higher success of sampling in relation to tissue obtained on histopathological examination.

Menopausal Status

Williams et al[65] reported premenopausal status as very strongly associated with overall success of sampling. Study by Bakour et al[61] reported that postmenopausal status was significantly associated with insufficient sample to unadjusted analysis, but failed to show any difference when multivariate regression analysis was used.

In our study of the 70 premenopausal patients adequate tissue at histopathology examination was available in 64 patients (91.4%). But, of the 30 postmenopausal patients, report was available only in 24 (80%). The inference was not statistically significant. (p value = 0.107).

Endometrial Polyp

Gordon et al[62] found that 50% of patients with an inadequate Pipelle sample had polyps or submucous fibroid. Fakher et al[46] in their study on validity of Pipelle sampling of 100 cases found that both cases reported as inadequate on Pipelle were benign polyps on D&C report.

In our study, it was noted that of the 12 patients who yielded insufficient sample with Pipelle device, definite diagnosis came as endometrial polyp in 8 cases.

Endometrial thickness and insufficient sample

Bakour et al[61] evaluated 248 women with AUB using Pipelle technique .74 insufficient sample were obtained and all the 74 were followed with hysteroscopy and ultrasound for endometrial thickness. When the hysteroscopy finding was endometrial atrophy, the sample obtained by Pipelle was insufficient. Similarly, when the ET was below 5mm,the sample was insufficient.

In our study it was observed that endometrial thickness did not contribute significantly to the adequacy of tissue during sampling. Of the 9 patients with endometrial thickness at or below 6 mm, adequate tissue for histopathological diagnosis was available in 8 cases.

Parity

Williams et al [65] reported that failure of insertion of Pipelle was found to be more common with nulliparity (22%-nulliparous, 8%-parous). Insufficient sample was seen in nulliparous women, 25% as compared with parous women 5%. Bakour et al [61] found that there was no association between adequate sample and parity using multivariate regression analysis model.

In our study there was no insertion failure in nulliparous and those not delivered vaginally. The sample did not have sufficient number of nulliparous women to detect whether a difference really existed.

Endometrial Carcinoma

Between 1997-2000 Machado et al [60] analysed the pathology reports of 1535 patients with AUB. Pipelle technique was used to collect the endometrial sample in both pre- and postmenopausal women. 168 (10.9%) patients underwent D&C / hysterectomy at a later dates and the pathology report was compared with reports obtained with Pipelle. As the sensitivity, specificity and accuracy were comparable,it was inferred that atypical hyperplasia and endometrial cancer could be accurately diagnosed using Pipelle technique.

In our study the patients detected to have endometrial cancers were only two. Both were correctly identified by the Pipelle technique. The sensitivity and specificity of 100% observed in our study correspond to the observations made by Dijkhuizen and Machodo.

Adverse events associated with the procedure

Critchley et al [66] reported minor adverse effects like patient distress occurred in 10% of women of pipelle sampling. Ben-Baruch et al reported that procedure was well tolerated causing only occasional slight discomfort.In our study, no major adverse effects were reported. Few patients mentioned mild pain but the procedure was well tolerated. (Mean pain score 1.3)

Cost effectiveness

Shazia Fakhar et al (2008)[46] reported the cost per case was £39.46 for dilatation and curettage as compared to £4.74 for the Pieplle. The cost included the procedure, anesthesia, surgery and inpatient charges.

The cost of Pipelle sampling was Rs.250, compared to Rs.2000 for D&C, which was done under anesthesia .Although the higher inadequate tissue rate of Pipelle sampling was taken into consideration, Pipelle was certainly more cost effective than D&C.

LIMITATIONS OF STUDY

The number of patients enrolled in the study was less and so statistically significant inferences could not be made with regard to various factors.

SUMMARY

1) All patient underwent both Pipelle sampling and D&C. D&C was considered as the definitive procedure for diagnosis
2) Maximum number of patients were in the age group of 41-45 years.
3) 70% (70) were premenopausal and 30% were post menopausal (30).
4) Premenopausal patient had menorrhagia as their main complaint. Most of the Post menopausal patients had post Menopausal bleeding as their complaint.
5) 5 were nulliparous, 13 of them had delivered once, 57 of them delivered twice, 25 of them delivered three or more times.
6) 87 of them had delivered vaginally, 8 of them delivered by caesarian section.
7) An endometrial thickness of more than 9mm was present in 72.85% of premenopausal patients.It was 43.3% in the postmenopausal patients.

IN PIPELLE SAMPLING

- Sufficient sample was obtained in 72 patients and 28 patients had insufficient sample. With D&C, sufficient sample was obtained in all patients.
- HPE Report obtained in Pipelle was only 88 %, whereas in D&C it was 100%.
- The most important factor associated with scanty tissue at Pipelle sampling was found to be endometrial polyp.
- There was 100 % sensitivity and specificity of Pipelle for diagnosing endometrial carcinoma and endometrial hyperplasia.
- 4 out of the 70 premenopausal patients had difficult procedure (5.7%), where as it was 1 out of the 30 in postmenopausal patients (3.3%).
- In nulliparous women 40% had tough procedure.
- Among those with easy procedure, sufficient sample was not obtained in 28 of 95 procedures (29.4%).
- Elderly patients (≥50 years) had more inadequate sample rate 53.3%.
- Sufficient sample was obtained in 77.8% in premenopasusal group, whereas in postmenopausal group it was only 50%.

- In premenopausal patients HPR was available in 64 patients (91.4%). In postmenopausal patients, report was available only in 24 (80%).
- HPE report was available in 16 out of 28 inadequate samples.
- ROC curve gave the cut –off value for endometrial thickness of 9mm for successful histopathology reporting.
- No major adverse events were associated with the procedure. All patients tolerated the procedure well.

CONCLUSION

- Endometrial sampling using Pipelle device is an easy and convenient method of getting tissue diagnosis.
- It can be done as an outpatient procedure without any anesthesia, when compared to D&C which is done under anesthesia.
- The sensitivity and specificity of this procedure in detecting endometrial hyperplasia and carcinoma were comparable with those of the standard procedure-D&C.
- Pipelle's sampling failed to detect endometrial polyp.
- Considering all factors together, though Pipelle sampling failed to get sufficient sample in 12% of cases, comparing the high specificity in detecting endometrial hyperplasia and carcinoma, the cost effectiveness and anesthetic morbidity, intra and postoperative complications,Pipelle sampling can be used as an effective screening procedure in the outpatient department.

ABBREVIATIONS

AUB – Abnormal Uterine Bleeding

D&C - Dilatation and Curettage

HIV –Human Immunodeficiency Virus

USG – Ultrasonogram

ECG –Electrocardiogram

HT –Hypertension

DM -Diabetes Mellitus

PID -Pelvic Inflammatory Disease

MT –Menopausal Transition

FMP –Final Menstrual Period

PMB –Post Menopausal Bleeding

DUB –Dysfunctional Uterine Bleeding

FSH –Follicle -Stimulating hormone

HNPCC –Hereditary Non Polyposis Colorectal Cancer

HPE –Histo Pathological Examination

TVUS –Transvaginal Ultrasonagraphy

ET -Endometrial Thickness

CI	-Confidence interval
P	–P Value
SD	-Standard Deviation
ACOG	–American College of Obstetrics and Gynaecology
SHG	–Sonohysterography
HSG	–Hysterosalpingography
NPV	–Negative Predictive Value
PPV	–Positive Predictive Value
HPR	–Histo Pathological Report
CS	–Cesarean Section
FTND	-Full Term Normal Delivery
FIGO	-International Federation of Gynecology and Obstetrics
ROC	–Receiver Operating Characteristic curve
AUC	-Area Under Curve

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PROFORMA

Patient name : Hospital no:
Age : DOA:
Occupation :
Religion :

Presenting complaints;

1. Increased bleeding pv- Duration of flow:
   Cycle length :
   Amount :

2. Dysmenorrhoea

3. Lower abdomen pain

4. Mass per abdomen

Menstrual history

Menarche: LMP
PMB

Duration of flow: Amount of flow:
Cycles :
Menopause : YES/NO Duration of menopause;

Obstetric history

Married/unmarried If married, age at marriage

Parity index
Sterilisation

Past history
HT/DM
Personal history

Treatment history:
Any hormone therapy / Ablative procedures:

EXAMINATION

Height: Weight:
General condition
Per abdomen:

Per speculum

Pervaginum

Investigations:

USG
Uterine size
Endometrial thickness
Ovaries
Others
abnormalities

Pipelle Endometrial sampling:

Date:

Procedure: Easy/tough
Sample : Sufficient/scanty
Pain Score:

HPE Report: Biopsy no:

Dilatation and curettage:

Date:

Per op findings

HPE report:

Sno	Name	Hosp.no	Age	HBEno	AUB duration	Other comp	Meno pause	Parity	Delivery	LCB	Contraception	Past history	PA EXAM	PS Exam	PV Exam	ET	USG	Sampling	Date of report	Tissue Sample	HPE Report-pipelle	HPE Report- D & C	Pain Score
1	Mathavi	35139	44	G1113/11	3 MA bleeding		no	P2 L3	FTND	20	sterilized	NIL	Soft	bleeding	ut bulky	13	bulky	no dil, easy	2/7/11	sufficient	secretory	secretory	2
2	Subbulakshmi	36527	52	G1129/11	PMB	LBA +	2 y	P2 L2	FTND	25	sterilized	HT	Soft	ns	not madeout	9	ns	no dil, easy	6/7/11	scanty	proli	proli	1
3	Bharathi	37907	45	G1180/11	PMB	LBA + dys	1.5 Y	P2 L2	FTND	13	sterilized	NIL	Soft	ns	ut ns	8	ns	no dil, easy	13/07/11	scanty	no report	secretory	2
4	Ayisha	35139	38	G1178/11	7 M Menorrhagia	lap + dys	no	P2 L2	FTND	15	sterilized	NIL	Soft	ns	ut ns	13	ns	no dil, easy	13/7/11	sufficient	dis proli	dis proli	1
5	Ambikha	57626	42	G792/11	6 M Menorrhagia		no	P2 L2	FTND	13	sterilized	HT	Soft	ns	ut ns	15	ns	no dil, easy	14/7/11	sufficient	secretory	secretory	2
6	Saradha	38611	39	G1190/11	3 MA bleeding		no	P2 L2	FTND	11	sterilized	NIL	Soft	bleeding	ut 8 wk	15	bulky	no dil, easy	14/7/11	sufficient	secretory	secretory	2
7	Amsavalli	36603	40	G1223/11	8 M Menorrhagia	lap + dys	no	P3 L3	FTND	12	sterilized	NIL	Soft	ns	ut ns	5	ns	no dil, easy	19/7/11	scanty	proli	proli	1
8	Sowndaravalli	37608	46	G527/12	PMB	LBA	16 M	P2 L2	FTND	22	sterilized	EPILEPTIC	Soft	ns	ut ns	8	ns	no dil, easy	25/7/11	scanty	proli	proli	1
9	Rajamani	41447	38	G1393/11	metrorrhagia 7M		no	P3 L2	FTND	12	sterilized	NIL	Soft	bleeding	ut ns	15	ns	no dil, easy	11/8/11	sufficient	secretory	secretory	2
10	Rajeshwari	44201	40	G1376/	meno metrorrhagia-6M		no	P1 L1	CS	15	sterilized	DM	Soft	cx polyp	ut ns	13	ns	no dil, easy	12/8/11	sufficient	secretory	secretory	1
11	Vijaya	44801	40	G1394/11	metrorrhagia 4M		no	P2L2	FTND	13	sterilized	NIL	Soft	ns	ut ns	5	ns	no dil, easy	17/8/11	scanty	secretory	secretory	1
12	Sumathy	43746	46	G1403/11	PMB	dys	2 Y	P2 L2	FTND	13	sterilized	NIL	Soft	ns	ut ns	8	ns	no dil, easy	18/8/11	scanty	dis proli	dis proli	2
13	Indhumathy	43588	45	G1349/11	meno metrorrhagia-4M		no	P2 L2	FTND	19	sterilized	NIL	Soft	ns	ut ns	8	ns	no dil, easy	18/8/11	sufficient	secretory	secretory	1
14	Vadachy	46219	45	G1471/11	PMB		18 M	P3 L1	FTND	18	sterilized	NIL	Soft	ns	ut ns	7	left ovariancyst	no dil, easy	30/8/11	scanty	dis proli	dis proli	3
15	Banumathi	57466	48	G1726/11	6 M Menorrhagia		no	P1 L1	FTND	21	sterilized	BA	Soft	ns	ut ns	14	ns	no dil, easy	14/10/11	sufficient	proli	proli	1
16	Rajammal	34326	37	G1126/11	meno metrorrhagia-7M		no	P2 L1	CS	13	sterilized	NIL	Soft	ns	ut ns	14	PCOD	no dil, easy	22/10/11	sufficient	secretory	secretory	2
17	Lakshmi	67032	40	G2006/11	metrorrhagia 4M		no	P1L1	FTND	18	sterilized	NIL	Soft	ns	ut ns	14	ns	no dil, easy	2/12/11	sufficient	proli	proli	2
18	Nanjammal	67020	45	G2004/11	5 M Menorrhagia		no	P3 L3	FTND	18	sterilized	NIL	Soft	ns	ut 8 wk	12	fibroid	no dil, easy	2/12/11	sufficient	secretory	secretory	1
19	Shanthi	66345	45	G2003/11	meno metrorrhagia-4M		no	P2 L2	FTND	20	sterilized	NIL	Soft	ns	not madeout	10	ns	no dil, easy	2/12/11	sufficient	secretory	secretory	1
20	Vasanthi	450810	57	G2023/11	PMB	LBA +	14 m	P3 L3	FTND	25	not ster	NIL	Soft	ns	ut ns	7	ns	no dil, easy	8/12/11	scanty	no report	secretory	2
21	Kavitha	69095	33	G2042/11	metrorrhagia 4M		no	P2 L2	FTND	13	sterilized	NIL	Soft	ns	ut ns	5	ns	no dil, easy	########	scanty	dis proli	dis proli	1
22	Valli	68585	35	G2008/11	3M Menorrhagia		no	P3 L3	CS	12	sterilized	BA	Soft	ns	ut bulky	15	ns	no dil, easy	14/12/11	scanty	proli	proli	1
23	Kalavathy	69739	49	G2082/11	PMB		4 Y	P2L1	FTND	21	sterilized	DM	Soft	cx hyt	ut ns	8	ns	no dil, easy	14/12/11	scanty	secretory	secretory	2
24	Punniam	69107	48	G2103/11	PMB	LBA +	14 M	P2 L2	FTND	25	sterilized	NIL	Soft	ns	ut ns	8	ns	no dil, easy	19/12/11	scanty	no report	proli	2
25	Sarathamani	71635	55	G2186/11	PMB		5 Y	P2 L2	FTND	25	sterilized	NIL	Soft	ns	ut ns	7	ns	no dil, easy	2/1/12	scanty	dis proli	dis proli	1
26	Usha	73868	36	G6/12	bleeding 4 MA		no	P3 L3	FTND	8	sterilized	NIL	Soft	bleeding	ut ns	8	ns	no dil, easy	5/1/12	sufficient	secretory	secretory	3
27	Lakshmi	73869	41	G2/12	3 M Menorrhagia	lap +dys	no	P1 L1	FTND	18	sterilized	NIL	Soft	ns	ut 6 wk	18	ns	no dil, easy	5/1/12	sufficient	dis proli	dis proli	1
28	Deivanai	71633	47	G4/12	PMB		18 M	P2 L2	FTND	22	not ster	NIL	Soft	ns	ut ns	11	ns	no dil, easy	5/1/12	sufficient	proli	proli	1
29	Valarmathy	1239	48	G40/12	PMB	pain	2 Y	P1 L1	FTND	22	sterilized	HT	Soft	ns	ut ns	9	ns, right renal calculi	no dil, easy	12/1/12	scanty	no report	proli	2
30	Kayarnisha	451	38	G32/12	5 M Menorrhagia		no	P1 L1	FTND	18	sterilized	HT	Soft	ns	ut bulky	11	ns	no dil, easy	12/1/12	sufficient	proli	proli	1
31	Rabith	781	51	G16/12	PMB		13 M	P2 L2	FTND	23	not ster	NIL	Soft	ns	ut ns	9	ns	no dil, easy	19/1/12	sufficient	proli	proli	2
32	Thulasi	781	51	G59/12	3M Menorrhagia		no	P3 L3	FTND	24	sterilized	NIL	Soft	ns	ut ns	5	ns	no dil, easy	19/1/12	scanty	atrophic	atrophic	1
33	Gowri	1056	50	G58/12	PMB	lap	4 Y	P3 L3	FTND	25	sterilized	HT / DM	Soft	ns	ut bulky	10	ns	no dil, easy	19/1/12	sufficient	proli	proli	2
34	Rajamani	566	42	G73/12	meno metrorrhagia-5M		no	P2 L2	FTND	18	sterilized	HT	Soft	ns	not madeout	10	ns	no dil, easy	21/1/12	sufficient	secretory	secretory	1
35	Samiyathal	1699	45	G92/12	PMB		2 Y	P2 L2	FTND	21	sterilized	NIL	Soft	ns	ut ns	13	adenomyosis	no dil, easy	21/1/12	sufficient	dis proli	dis proli	1
36	Bindhu	2063	35	G79/12	metrorrhagia 5M		no	P2 L1	FTND	15	sterilized	NIL	Soft	cx polyp	ut ns	14	ns	no dil, easy	23/1/12	sufficient	proli	proli	3
37	Kalavathy	3017	40	G77/12	3 MA, bleeding		no	P1 L1	FTND	16	sterilized	NIL	Soft	cx hyt	ut ns	13	PCOD	no dil, easy	23/1/12	sufficient	dis proli	dis proli	2
38	latha	3245	38	G97/12	Metrorrhagia-3 M	LBA +	no	P2 L2	CS	13 Y	sterilized	HT/DM	Soft	ns	ut ns	15	ns	no dil, easy	25/1/12	sufficient	secretory	secretory	2
39	Kowsalya	247	52	G133/12	PMB		3 Y	P2 L2	FTND	19	sterilized	NIL	Soft	ns	ut ns	5	ns	no dil, easy	1/2/12	scanty	atrophic	atrophic	1
40	Chithra	4527	50	G142/12	PMB	LBA +	5 Y	P1 L0	FTND	29	sterilized	NIL	Soft	ns	ut bulky	18	irregular echogenicmass	no dil, easy	2/2/12	sufficient	adenocarcinoma	adenocarcinoma	1
41	Chithrakala	1482	42	G149/12	5 M Menorrhagia	dys +	no	P2 L2	FTND	16	sterilized	NIL	Soft	ns	ut ns	13	ns	no dil, easy	3/2/12	sufficient	secretory	secretory	1
42	Krishnaveni	6258	37	G94/12	metrorrhagia 8M		no	P2 L2	CS	8	sterilized	NIL	Soft	bleeding	ut ns	7	ns	no dil, easy	14/2/12	sufficient	proli	proli	1
43	Nagalakshmi	6921	40	G197/12	3 MA bleeding 20 days		no	P2 L2	FTND	18	sterilized	DM	Soft	cx hyt	ut ns	11	ns	no dil, easy	14/2/12	sufficient	secretory	secretory	2
44	Usha	7566	40	G209/12	6M Menorrhagia	dys +	no	P2 L2	FTND	15	sterilized	HT	Soft	ns	ut 8 wk	12	fibroids	tough	15/2/12	sufficient	secretory	secretory	3
45	Vasanthi	7552	33	G208/12	metrorrhagia 8M		no	NULLI		10	sterilized	NIL	Soft	ns	ns lt adenxa +	20	ut bulky left ovariancyst	no dil, easy	15/2/12	sufficient	com hyper(no atypia)	com hyper (no atypia)	2
46	Mariyammal	6477	50	G214/12	PMB		16 m	P2 L2	FTND	27	sterilized	NIL	Soft	ns	ut ns	8	ns	no dil, easy	16/2/12	scanty	no report	secretory	1
47	Dhanalakshmi	10452	40	G250AB	metrorrhagia 6M		no	P3 L3	FTND	13	sterilized	NIL	Soft	ns	ut ns	12	ns	no dil, easy	25/2/12	sufficient	proli	proli	2
48	Shanthamani	3006	45	G259/12	PMB		18 M	P2 L2	FTND	16	sterilized	NIL	Soft	ns	ut bulky	12	bulky, fibroids	tough	25/2/12	sufficient	proli	proli	3
49	Nabesha	10277	40	G268/12	9 M Menorrhagia		no	P2 L1	FTND	16	sterilized	NIL	Soft	ns	ut 10 wk	15	fibriod	no dil, easy	1/3/12	sufficient	dis proli	dis proli	1
50	Nabesha	11272	50	G290/12	6M Menorrhagia	lap	no	P2 L1	FTND	25	sterilized	HT	Soft	ns	not madeout	7	ns	no dil, easy	3/3/12	scanty	no report	proli	2
51	Sumathy	12979	45	G339/12	PMB		14 M	P3 L3	FTND	13	sterilized	NIL	Soft	ns	ut ns	9	ns	no dil, easy	13/3/12	sufficient	secretory	secretory	2
52	Meena	16231	40	G438/12	6 M Menorrhagia	LBA + dys	no	P2 L2	FTND	13	sterilized	NIL	Soft	ns	ut ns	6	BL ovariancyst	no dil, easy	13/3/12	scanty	only blood clot	secretory	1
53	Kamala	13205	31	G344/12	5 M Menorrhagia		no	P2 L2	FTND	7	sterilized	NIL	Soft	ns	ut ns	14	ns	no dil, easy	15/3/12	sufficient	secretory	secretory	1
54	Ponnammal	11453	43	G297/12	metrorrhagia 4M		no	P1 L1	FTND	16	sterilized	HT	Soft	ns	ut ns	13	ns	no dil, easy	6/3/12	sufficient	secretory	secretory	2
55	Malarkodi	13829	38	G149/12	meno metrorrhagia-7M	lap	no	P2 L3	FTND	13	sterilized	NIL	Soft	ns	ut ns	13	ns	no dil, easy	16/3/12	sufficient	secretory	secretory	1
56	Rajeshwari	13799	45	G357/12	meno metrorrhagia-5M		no	P2 L2	FTND	21	sterilized	NIL	Soft	bleeding	ut 6 wk	8	fibroid	no dil, easy	16/3/12	scanty	no report	proli	1
57	Brindha	11848	44	G364/12	4 M Menorrhagia		no	P2 L2	FTND	16	sterilized	DM	Soft	ns	ut ns	7	adenomyosis	no dil, easy	16/3/12	scanty	no report	proli	1
58	Subbulakshmi	9623	52	G359/12	PMB		14 M	P3 L3	FTND	23	not ster	HT	Soft	ns	atrophic	11	ns	no dil, easy	16/3/12	sufficient	dis proli	dis proli	1
59	Manju	14266	39	G397/12	metrorrhagia 6M		no	P3 L3	FTND	15	sterilized	EPILEPTIC	Soft	ns	ut ns		ns	no dil, easy	22/3/12	sufficient	secretory	secretory	2
60	Saraswathy	15198	40	G402/12	metrorrhagia-4M	LBA + lap	no	P3 L3	FTND	14	sterilized	NIL	Soft	bleeding	ut 10 wk	10	fibroids	no dil, easy	24/3/12	sufficient	dis proli	dis proli	1
61	Jayalakshmi	14336	45	G413/12	PMB		2 Y	P5 L5	FTND	19	sterilized	NIL	Soft	cx hyt	ut ns	9	ns	no dil, easy	26/3/12	sufficient	proli	proli	1
62	vijaya	10080	45	G422/12	meno metrorrhagia-4M		no	P2 L2	FTND	15	sterilized	NIL	Soft	ns	ut ns	10	ns	no dil, easy	29/3/12	sufficient	secretory	secretory	3
63	Rajeshwari	16563	48	G426/12	PMB	NIL	3 Y	P5L5	FTND	18	sterilized	NIL	Soft	ns	ut ns	10	ns	no dil, easy	30/3/12	sufficient	secretory	secretory	1
64	Padmavathy	15880	42	G630/12	2 MA bleeding		no	P2 L2	FTND	18	sterilized	NIL	Soft	ns	ut bulky	14	left renel calculite	no dil, easy	30/3/12	sufficient	proli	proli	2
65	Lakshmi	16568	48	G429/12	PMB	dys	14 M	P2 L2	FTND	21	sterilized	NIL	Soft	ns	ut bulky	7	bulky	no dil, easy	30/3/12	scanty	no report	proli	1
66	Asanammal	16913	40	G443/12	5 M Menorrhagia		no	NULLI		20	sterilized	NIL	Soft	bleeding	ut bulky		ns	no dil, easy	2/4/12	sufficient	proli	proli	1
67	Gangadevi	16501	47	G470/12	meno metrorrhagia-7M		no	P2 L2	FTND	22	sterilized	BA	Soft	ns	ut 8 wk	13	fibroids	no dil, easy	9/4/12	sufficient	proli	proli	2
68	Santhamani	18169	35	G480/12	2 M Menorrhagia		no	P2 L2	FTND	15	sterilized	NIL	Soft	cx hyt	ut ns	11	ns	tough	9/4/12	sufficient	proli	proli	3
69	Rukemani	17409	47	G469/12	10 MA Bleeding	LBA + lap	no	P2 L2	FTND	22	sterilized	NIL	Soft	ns	not madeout	13	ns, hepaticcyst	no dil, easy	9/4/12	sufficient	dis proli	dis proli	1

70	Padmavathy	17223	47	G5303/1	6 M Menorrhagia		no	P1 L1	CS	23	not ster	DM	Soft	ns	ut ns	9	ns	no dil, easy	17/4/12	sufficient	proli	proli	1
71	Uma	17474	52	G497/12	PMB	LBA +	8 Y	NULLI		23	sterilized	HT	Soft	ns	ut 8 wk	20	irregular echogenicmass	no dil, easy	17/4/12	sufficient	adenocarcinoma	adenocarcinoma	2
72	Maragatham	2014	42	G509/12	5 M Menorrhagia		no	P2 L1	FTND	18	sterilized	NIL	Soft	ns	ut ns	6	BL ovariancyst	no dil, easy	17/4/12	scanty	secretory	secretory	1
73	Arokyameri	26958	42	G591/12	4 M Menorrhagia	LBA + dys	no	P3 L3	FTND	15	sterilized	NIL	Soft	cx hyt	ut ns		ns	no dil, easy	19/4/12	sufficient	dis proli	dis proli	1
74	Dhanalakshmi	21550	45	G544/12	12 M Menorrhagia	dys + lap	no	P2 L2	FTND	16	sterilized	HT	Soft	ns	ut 8 wk	15	fibroids	no dil, easy	21/4/12	sufficient	dis proli	dis proli	1
75	Murugammal	21273	41	G365/12	6 M Menorrhagia		no	P3 L3	FTND	13	sterilized	NIL	Soft	ns	ut 10 wk	14	fibroids	no dil, easy	21/4/12	sufficient	dis proli	dis proli	1
76	Selvi	21976	45	G550/12	PMB	pain	15 M	P3 L3	FTND	19	sterilized	NIL	Soft	ns	ut ns	10	right ovariancyst	no dil, easy	24/4/12	sufficient	proli	proli	2
77	Usha	17470	34	G531/12	5 M Menorrhagia		no	P2 L2	CS	8	sterilized	NIL	Soft	ns	ut ns	8	ns	no dil, easy	23/4/12	sufficient	proli	proli	1
78	Mariyammal	18171	42	G568/12	7 M Menorrhagia		no	P2 L2	FTND	20	not ster	HT	Soft	ns	ut ns	8	ns	no dil, easy	30/4/12	scanty	no report	proli	1
79	Abitha	21564	40	G576/12	3 MA bleeding 25 days		no	P2 L3	FTND	17	sterilized	NIL	Soft	ns	ut ns	8	ns	no dil, easy	3/5/12	sufficient	secretory	secretory	3
80	Indirani	23372	50	G604/12	PMB	LBA +	14 M	P2 L2	FTND	18	sterilized	NIL	Soft	ns	ut ns	12	ns	no dil, easy	7/5/12	sufficient	dis proli	dis proli	1
81	Velammal	214595	45	G621/12	2 MA, bleeding 1Month		no	P2 L3	FTND	15	sterilized	NIL	Soft	bleeding	ut ns	13	ns	no dil, easy	10/5/12	sufficient	proli	proli	2
82	Meena	23847	54	G624/12	PMB		18 M	P4 L4	FTND	21	sterilized	NIL	Soft	cx hyt	ns rt adenxa +	11	right ovariancyst	no dil, easy	10/5/12	sufficient	proli	proli	1
83	Jegarammal	24179	30	G628/12	10 M Menorrhagia		no	P2 L3	FTND	8	sterilized	NIL	Soft	ns	ut ns	15	fibroids	no dil, easy	11/5/12	sufficient	proli	proli	1
84	Rathineshwari	22400	38	G651/12	metrorrhagia 6M		no	P1 L2	FTND	9	sterilized	NIL	Soft	bleeding	ut ns	15	ns	no dil, easy	16/5/12	sufficient	dis proli	dis proli	2
85	Vasanthamani	26055	30	G666/12	metrorrhagia 4M		no	P2 L2	FTND	2	sterilized	NIL	Soft	ns	ut ns	5	PCOD	no dil, easy	17/5/12	scanty	dis proli	dis proli	1
86	Lakshmi	23612	35	G672/12	metrorrhagia 5M		no	P2 L2	FTND	8	sterilized	NIL	Soft	ns	ut ns	14	ns	no dil, easy	18/5/12	sufficient	secretory	secretory	1
87	Lakshmi	26843	38	G696/12	2 MA , Bleeding 15 d		no	P1 L1	FTND	14	sterilized	HT	Soft	ns	ut ns	13	ns	no dil, easy	24/5/12	sufficient	proli	proli	2
88	Aaral	25062	40	G694/12	metrorrhagia 8M		no	P2 L2	FTND	14	sterilized	ANEMIA	Soft	ns	ut bulky	14	fibroid	no dil, easy	24/5/12	sufficient	dis proli	dis proli	1
89	Visalakshi	28981	49	G739/12	PMB		2 y	P2 L2	FTND	18	sterilized	NIL	Soft	ns	ut ns	12	ns	no dil, easy	4/6/12	sufficient	proli	proli	1
90	Vijayalakshmi	233652	35	G810/12	metrorrhagia 4M		no	P3 L3	FTND	7	sterilized	NIL	Soft	ns	ut ns	17	ns	no dil, easy	18/6/12	sufficient	dis proli	dis proli	1
91	Thangam	35541	41	G850/12	meno metrorrhagia-6M		no	P2 L2	FTND	16	sterilized	NIL	Soft	cx hyt	ut bulky	13	fibroids	no dil, easy	26/6/12	sufficient	secretory	secretory	1
92	Nanjammal	30260	45	G864/12	PMB		2 Y	P1 L0	FTND	16	not ster	NIL	Soft	ns	ut ns	8	ns	no dil, easy	29/6/12	scanty	proli	proli	1
93	Dhanalakshmi	37147	33	G881/12	meno metrorrhagia-8M		no	NULLI		9	sterilized	NIL	Soft	cx polyp	ut bulky	15	PCOD	tough	3/7/12	sufficient	secretory	secretory	3
94	Kanakeshwari	37760	43	G884/12	metrorrhagia 5M		no	P2 L2	FTND	19	sterilized	NIL	Soft	ns	ut ns	8	ns	no dil, easy	4/7/12	scanty	dis proli	dis proli	1
95	Subbulakshmi	38767	40	G918/12	3 M Menorrhagia		no	NULLI		21	sterilized	NIL	Soft	ns	ut bulky	15	fibroid	tough	12/7/12	sufficient	dis proli	dis proli	3
96	Rangammal	38817	40	G937/12	meno metrorrhagia-5M		no	P3 L3	FTND	12	not ster	NIL	Soft	bleeding	ut bulky	14	adenomyosis	no dil, easy	17/7/12	sufficient	dis proli	dis proli	1
97	Parvathy	38831	40	G942/12	8 M Menorrhagia	dys + lap	no	P3 L3	FTND	13	sterilized	NIL	Soft	ns	ut ns	16	PCOD	no dil, easy	18/7/12	sufficient	proli	proli	1
98	Subbulakshmi	40274	42	G954/12	metrorrhagia 5M		no	P4 L2	FTND	14	sterilized	H/O ATT	Soft	ns	ut ns	5	ns	no dil, easy	19/7/12	scanty	no report	proli	1
99	Vasanthamani	40302	35	G950/12	5 M Menorrhagia		no	P2 L2	CS	8	sterilized	NIL	Soft	ns	ut 8 wk	15	right ovariancyst	no dil, easy	19/7/12	sufficient	proli	proli	1
100	Chandra	40326	51	G955/12	PMB		15 M	P5 L4	FTND	18	sterilized	DM	Soft	ns	ut ns	12	ns	no dil, easy	19/7/12	sufficient	dis proli	dis proli	1

***KEY WORDS**

M	Months	LCB	Last child birth	P	parity
PMB	Post Menopausal Bleeding	ns	normal size	L	Living
Y	Years	cx hyt	cervix hypertrophy	CS	Cesareansection
dys	Dysmenorrhea	FTND	Full term normal delivery	wk	Week
lap	Lower abdominal pain	proli	proliferative	NULLI	Nulli parity
LBA	Low Back Ache	dis proli	dis ordered proliferative	Sec	Secretory
		com hyper	complex hyperplasia		